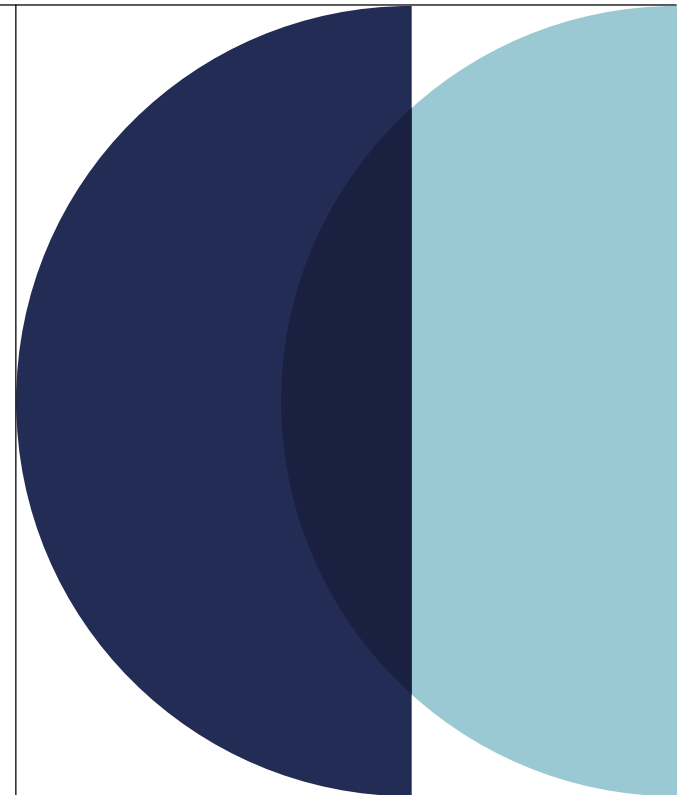




Total Fund Currency Attribution

**Performance Measurement
Forum Toronto**

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Currency Attribution in Context

CDPQ invests across markets and asset classes, resulting in important exposures to foreign currencies

CDPQ manages the funds of 48 depositors: to meet their objectives, investment strategies are tailored to their risk tolerance and their respective investment policies

Currency can influence return and value-added, and volatility in currency markets can have repercussions on our portfolios

Understanding contribution to return of currency exposures and hedging strategies is key

Today's Agenda

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Objectives for Currency Attribution at CDPQ



Understand the impact of currency on the returns of our portfolios



Effectively communicate that impact to a wide range of audiences – **it needs to be simple to understand**



Common approach and methodology for all asset classes – **ability to drill down**



Calculate currency impacts for total portfolio and benchmark, as well as for each depositor

How is currency attribution used within your organization? Is there demand for this type of information?

What systems are used to calculate currency attribution? Is it integrated with other systems?



Exposure-based Currency Allocation Model

1

Currency exposure by asset class

Aggregated from underlying security-level exposure data and filtered by type of exposure (either gross exposure or hedging exposure)

2

Exchange rates and forward rates

Used to calculate currency returns (spot return) and theoretical returns on currency hedges (or overlay realized returns can be used directly if available)

3

Portfolio information

Portfolio values, returns and weighting used to calculate contributions to total return

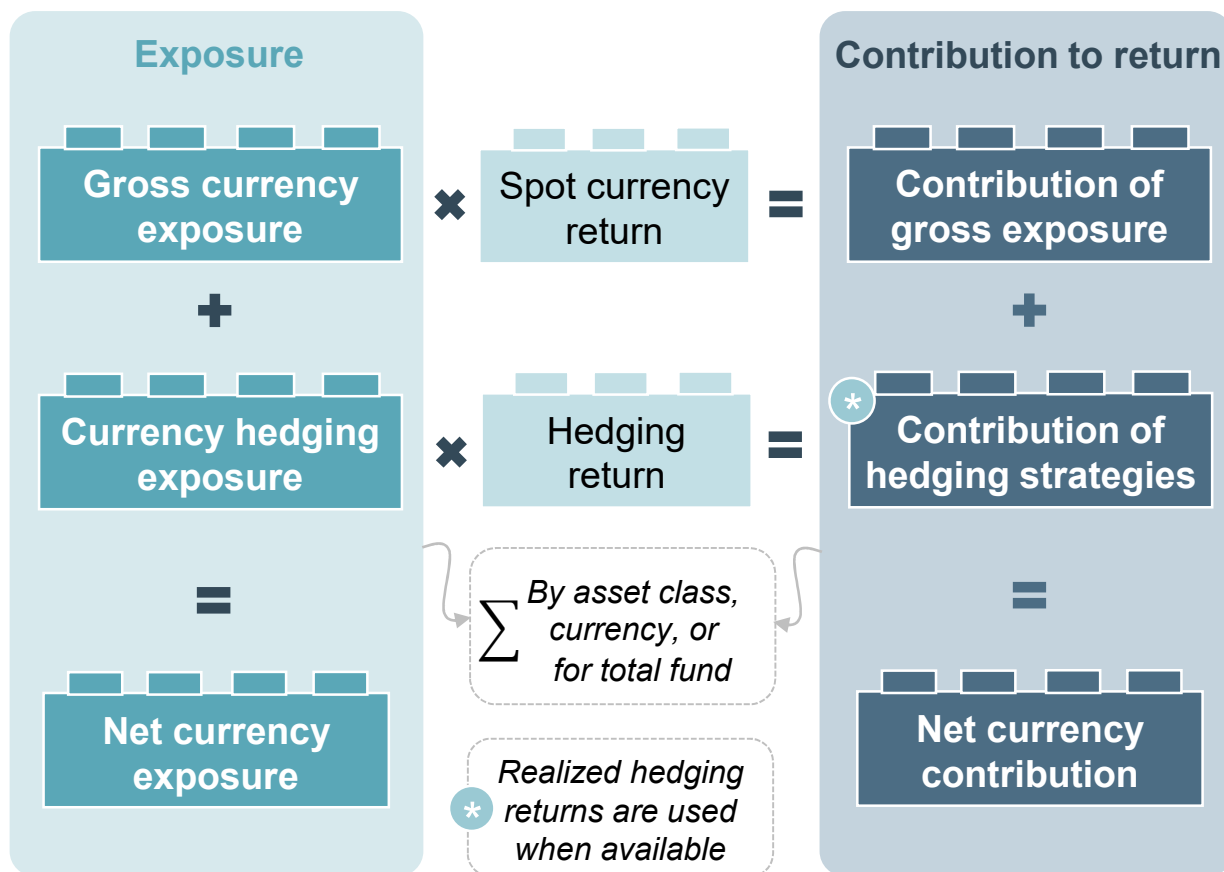
What type of currency exposure is available in the organization ?

Who is responsible for calculating currency exposure?



Building Block Approach to Currency Attribution

»» For each asset class / currency pair (portfolio or benchmark)



Summing each of the blocks yields the **net or total currency block**

Use blocks to create currency impact matrix where the user can **drill down by asset class and / or currency**

Contributions are monthly (or month-to-date); longer periods are calculated with a linking algorithm

Each block can be split by depositor participation and aggregated for each individual depositor



Example – Contribution to Asset Class Return

(bps)	Currency	Gross exposure	Gross contrib.	Hedging contrib.	Net contrib.
Public Equity	USD	60%	-120	57	-63
	EUR	25%	-50	24	-26
	CAD	15%			
	Total	100%	-170	81	-89
Fixed Income	USD	10%	-20	19	-1
	EUR	10%	-20	19	-1
	CAD	80%			
	Total	100%	-40	38	-2

Gross USD exposure for Public Equity

60 %



Spot USD return

-2,0 %



Gross USD contrib. to Public Equity

-120 bps

Canadian fund with USD and EUR exposure and 60%-40% allocation to Equity and Fixed Income

Currency hedging:
50 % in Equity
100 % in Fixed Income

Both USD and EUR show a spot return of -2,0%



Example – Contribution to Total Fund Return

(bps)	Currency	Gross exposure	Gross contrib.	Hedging contrib.	Net contrib.
Public Equity 60%	USD	36%	-72	34	-38
	EUR	15%	-30	14	-16
	Total	51%	-102	48	-54
Fixed Income 40%	USD	4%	-8	8	0
	EUR	4%	-8	8	0
	Total	8%	-16	16	0
Total Fund	USD	40%	-80	42	-38
	EUR	19%	-38	22	-16
	Total	59%	-118	64	-54

Contributions to each asset class re-weighted to obtain **total fund attribution for each of the blocks**

The same methodology can be applied to the benchmark, to **understand currency contribution to value-added**

Hedging levels in the benchmark can be **set to match policy**

Exposure and contribution for individual depositors calculated considering each depositor's participation

$$\begin{array}{l} \text{Net USD contrib. to Public Equity return} \\ -63 \text{ bps}^* \end{array} \times \begin{array}{l} \text{Weight of Public Equity in Total Fund} \\ 60 \% \end{array} = \begin{array}{l} \text{Net USD contrib. to Total Fund} \\ -38 \text{ bps} \end{array}$$

* Asset class contribution from previous page



Challenges in Currency Attribution

Volume of data

Matrix-style attribution generates a **large volume of data, requiring optimization** in systems and controls

Accuracy of inputs

Inputs from multiple data sources upstream, **so ensuring communication in controls and corrections is key**

Timeliness

Timing of data and **synching production times and closing periods** across teams, asset classes and systems

System interactions

Reliance on multiple input systems: increased points of failure, timing issues, more complex data correction

Definitions

Multi-asset class attribution available throughout the organization requires **standardizing definitions** across teams

How do you coordinate teams to ensure uniform interpretation across the organization?

What data controls are in place? Are they automated? Do you only control your data or external inputs as well?



Application for Currency Attribution



Understanding the role that currency plays in performance



Evaluating biases in our exposures and the impact on returns and value-added



Evaluating the performance of our hedging strategies and their impact returns and portfolio risk



Helping our depositors to understand the currency exposures in their portfolios



Additional tool in validating and explaining daily performance

Are overlay strategies used for currency hedging? Across all asset classes or varies by portfolio ?

Do you see practical applications for this type of model in your organization? What do you do that works well?

