



FX Transaction Cost Analysis

City of San Jose Police & Fire Department Retirement Plan

Reporting Period FY 2022/23

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Summary

San Jose Police and Fire has actively completed FX TCA since Q4 2012 in order to monitor the costs of completing foreign exchange transactions within its portfolio. They have been concerns over the FX pricing practices of custody banks, as well as concerns over market participants manipulating the foreign market for gain. The objective for staff has been to measure the cost¹ of FX transactions, and whenever possible seek to improve the pricing outcomes. As the changes are implemented, the staff has looked for ongoing monitoring to ensure pricing remains fair and efficient from the custodian, as well as making sure that investment managers are adhering to best execution policies.

Klarity FX has provided the staff with quarterly reporting on FX TCA performance and made recommendations where necessary. The plans overall performance² on FX transaction costs can be described as 'good'. The investment managers do not rely solely on the custody bank for FX execution, and actively seek the best execution from other FX counterparties wherever possible, this significantly helps in lowering overall FX costs for the plan and meets our best practice approach.

In Q4 2020 the plan changed its custodian bank from State Street to Bank of New York Mellon. Investment managers have been enrolled into the appropriate fx programs with BNY Mellon including the defined spread program. Analysis completed on transactions completed by BNY Mellon since October 2020 have shown excellent execution and a notable improvement in trading costs compared to State Street through the custodian relationship.

Since Q4 2012, the average transaction cost across the managers has been -0.02%, a good outcome.

State Street average cost	-0.09%	poor/acceptable/good
BNY Mellon average cost	-0.04%	poor/acceptable/good
All other FX Counterparties average cost	-0.010%	poor/acceptable/good

- For the FY22/23, the plan completed 1263 transactions for a total transaction volume of \$175mln with an average transaction size of \$139k.
- There were 6 participating investment managers, with Oberweis the most active, initiating 76% of total transactions, and 45% of transaction volume.
- There were 19 separate counterparties. With JP Morgan Chase the most active, completing 44% of transactions., and 33% of transaction volume.
- The custodian, BNY Mellon, completed 40% of the transactions.
- BNY Mellon completed 500 transactions, with a -0.06% spread taken on \$37mln in volume.
 - Oberweis continues to benefit from the adoption of the BNY Mellon Defined Spread program, with 121 of the 960 transactions applicable for the program with a -0.10% spread applied. The overall execution performance for Oberweis was -0.04%.
- The overall spread for 'All Other FX Counterparties' was -0.03%, a good result on 763 transactions.
- The long-term running total overall spread is maintained -0.02%.
- FX execution quality for the plan remains good and the improved fx transaction costs from the custodian witch to BNY Mellon has been maintained. There are no actions for any investment managers of fx counterparties.

¹ The available levels of analysis are explained in Appendix B&C

² For guidance purposes outcomes may be described as follows: good outcome is -0.05% to positive | acceptable outcome is -0.15% to -0.05% | poor outcome is below -0.15%
These outcomes reference the spread taken on a transaction. EG, A -0.20% spread taken on \$1,000,000 = \$2,000 taken. Which is qualified as a poor outcome.

Overview of FX Transactions

Period	2022/23
No. Transactions	1263
Total Volume Transacted	\$174,988,840
Average Trade Size	\$138,550
Spot / Forward	1246/17
FX Counterparties	19
FX Pairs	10
Investment Managers	6

Table 1. Data Summary

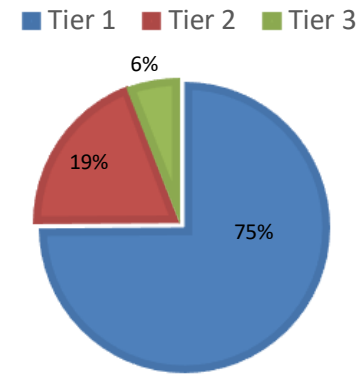


Figure 1. Transactions by currency tier

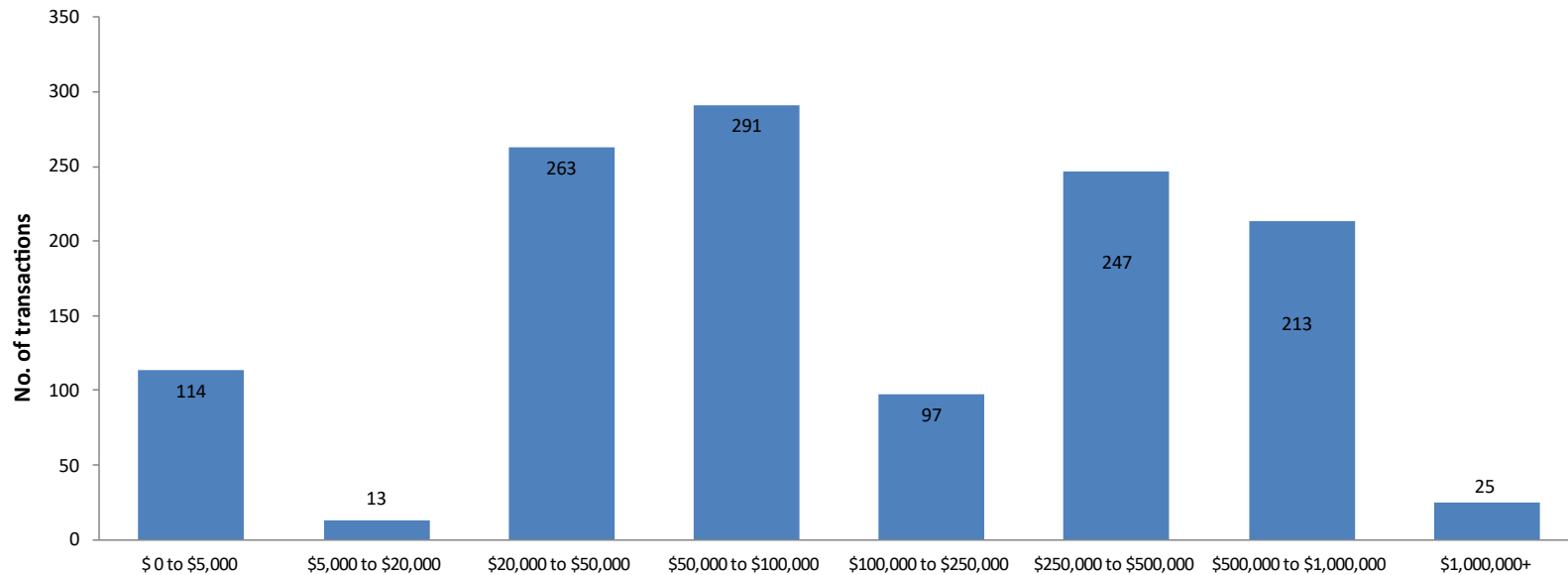
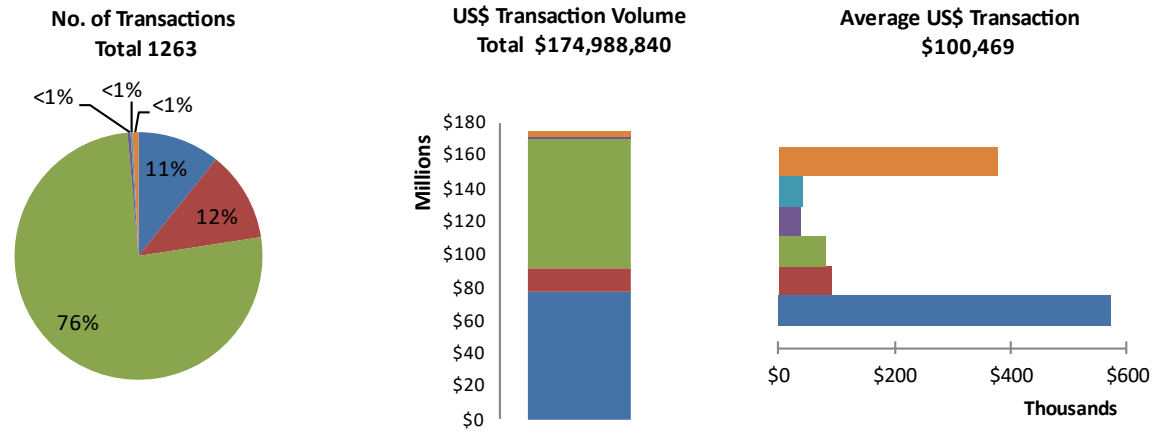


Figure 2. Transaction size distribution (\$)

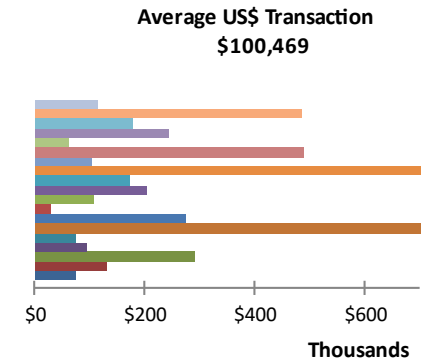
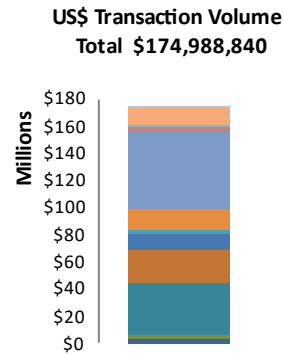
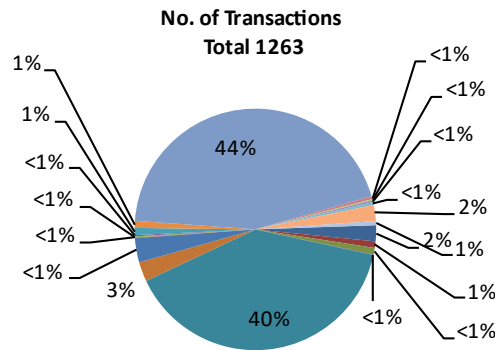
Investment Manager Breakdown



ARTISAN GLOBAL VALUE	136	\$77,817,839	\$572,190
MORGAN STANLEY INT	149	\$13,824,551	\$92,782
OBERWEIS INTL OPPORTUNITIES	960	\$79,272,857	\$82,576
ORION EURO RE IV	5	\$191,959	\$38,392
TRISTAN EPISO IV	3	\$128,512	\$42,837
TRISTAN EPISO V	10	\$3,753,122	\$375,312

Table 2. Investment manager data summary

FX Counterparties



BANK OF AMERICA N A	27	\$2,000,679	\$74,099
BANK OF MONTREAL THE	11	\$1,437,864	\$130,715
BARCLAYS BANK PLC WHOLESALE	11	\$3,183,572	\$289,416
BNP PARIBAS SA	1	\$93,714	\$93,714
BNY MELLON BANK	500	\$37,169,488	\$74,339
BROWN BROTHERS HARRIMAN AND CO	33	\$25,399,430	\$769,680
CITIBANK NA	41	\$11,272,825	\$274,947
CREDIT SUISSE INTERNATIONAL	1	\$30,723	\$30,723
DEUTSCHE BANK AG	2	\$211,063	\$105,531
FX CONNECT BROKER (FXC)	2	\$409,794	\$204,897
GOLDMAN SACHS INTERNATIONAL	12	\$2,048,347	\$170,696
HSBC BANK USA N A	12	\$15,906,175	\$1,325,515
JPMORGAN CHASE BK NA	561	\$57,748,416	\$102,938
MORGAN STANLEY CAPITAL SRVCS INC NY	5	\$2,440,857	\$488,171
NATWEST MARKETS PLC	2	\$124,333	\$62,167
NORTHERN TRUST COMPANY THE	3	\$724,089	\$241,363
STANDARD CHARTERED BANK	5	\$883,058	\$176,612
STATE STREET BANK AND TRUST CO	27	\$13,118,705	\$485,878
UBS AG	7	\$785,707	\$112,244

Table 3. FX counterparty data summary

Bank of New York Mellon Focus

	MORGAN STANLEY INT	OBERWEIS INTL OPPORTUNITIES	ORION EURO RE IV	TRISTAN EPI SO IV	TRISTAN EPI SO V	Total Transactions/ %Spread from Benchmark
BNY Bank Negotiated	4 0.01%	329 -0.05%	-	-	-	333 -0.04%
BNY Defined Spread	28 -0.10%	121 -0.10%	5 -0.11%	3 -0.11%	10 -0.11%	167 -0.10%
Total Transactions/ %Spread	32 -0.09%	450 -0.06%	5 -0.11%	3 -0.11%	10 -0.11%	500 -0.06%

Table 4. Breakdown of BNY Mellon transactions by execution method (Count & Average Spread)

	BNY Mellon		All Other FX Counterparties		All % Spread
	% Spread	Count	% Spread	Count	
\$0-5,000	-0.08%	77	-0.12%	37	-0.09%
\$5,001-20,000	-0.10%	2	-0.16%	11	-0.15%
\$20,001 -50,000	-0.02%	77	0.00%	186	0.00%
\$50,001-100,000	-0.04%	121	-0.04%	170	-0.04%
\$100,001-250,000	0.02%	20	-0.03%	77	-0.02%
\$250,001-500,000	-0.11%	132	-0.04%	115	-0.08%
\$500,001-1,000,000	-0.07%	66	0.00%	147	-0.02%
\$1,000,001+	-0.13%	5	0.00%	20	-0.03%
	-0.06%	500	-0.03%	763	-0.04%

Table 5. Comparison of BNY Mellon vs. All Other across transaction size

	% Spread	Average Transaction size	No. of Transactions
Tier 1	-0.06%	\$86,287.02	356
Tier 2	-0.10%	\$33,177.49	108
Tier 3	0.02%	\$79,670.52	36
	-0.06%	\$74,338.98	500

Table 6.BNY Mellon performance by Tier Group

	SJPF (BNY)	Peer Group	Performance
	% Spread	% Spread	SJPF/Peer
Grand Total	-0.06%	-0.11%	BETTER

Table 7. SJPF (BNY Mellon) performance compared to Peer Group

Summary Results

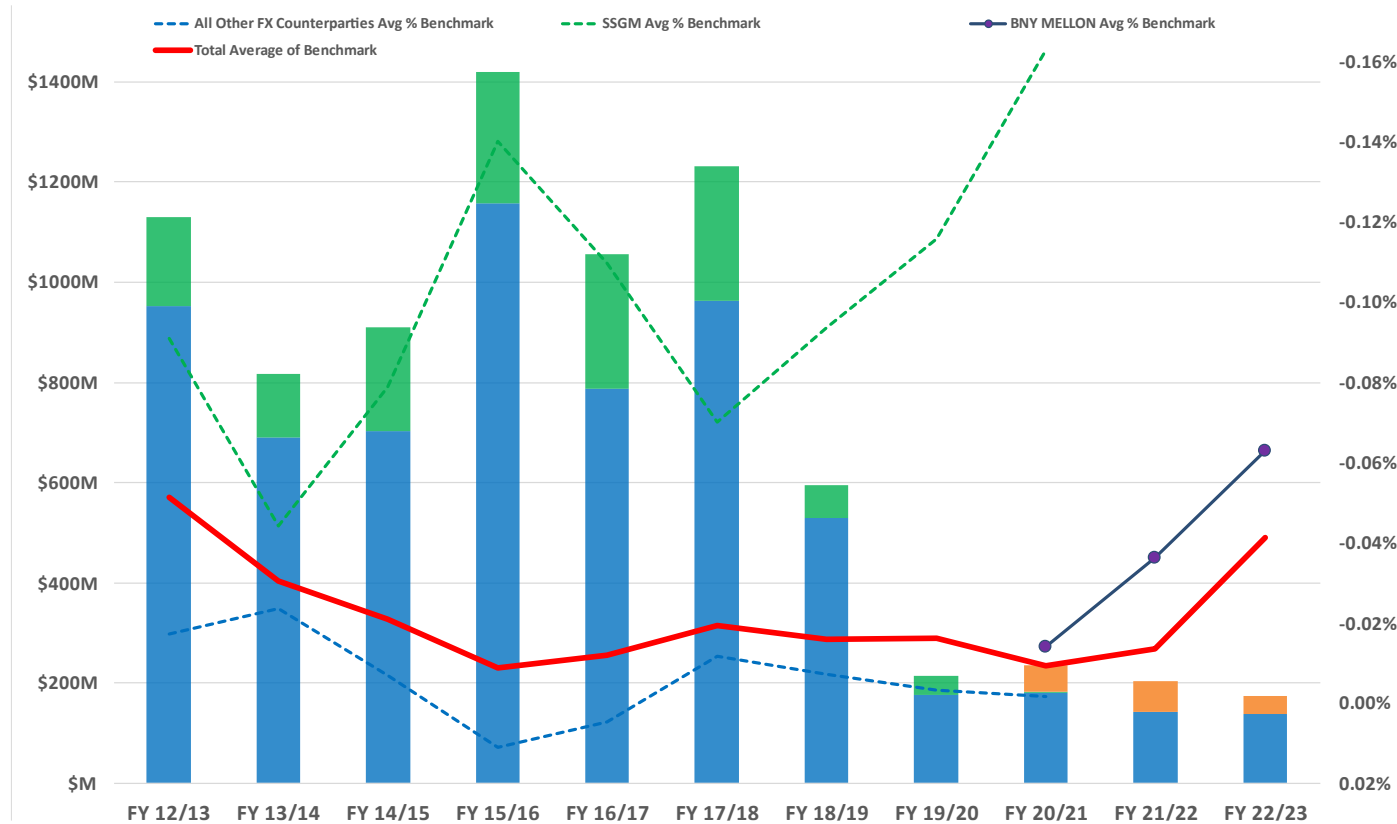


Figure 3. Avg % performance compared to transaction volume for SSGM / BNY Mellon vs. All Other FX Counterparties, by Fiscal Year

	FY 12/13	FY 13/14	FY 14/15	FY 15/16	FY 16/17	FY 17/18	FY 18/19	FY 19/20	FY 20/21	FY 21/22	FY 22/23	Grand Total
All Other FX Counterparties - Volume	\$952.8M	\$690.3M	\$703.1M	\$1157.3M	\$787.2M	\$963.7M	\$528.5M	\$176.2M	\$180.2M	\$142.8M	\$137.8M	\$6419.9M
SSGM (GRP) - Volume)	\$176.9M	\$126.4M	\$206.1M	\$261.4M	\$268.6M	\$268.3M	\$67.2M	\$38.7M	\$1.8M	-		\$1415.3M
BNY Mellon (GRP) - Volume)									\$53.5M	\$60.7M	\$37.2M	\$151.4M
All Other FX Counterparties - Avg % Spread	-0.02%	-0.02%	-0.01%	0.01%	0.00%	-0.01%	-0.01%	0.00%	0.00%	0.00%	-0.03%	-0.01%
SSGM (GRP) - Avg % Spread	-0.09%	-0.04%	-0.08%	-0.14%	-0.11%	-0.07%	-0.09%	-0.12%	-0.16%	-		-0.09%
BNY Mellon (GRP)									-0.01%	-0.04%	-0.06%	-0.04%
Grand Total	-0.05%	-0.03%	-0.02%	-0.01%	-0.01%	-0.02%	-0.02%	-0.02%	-0.01%	-0.01%	-0.04%	-0.02%

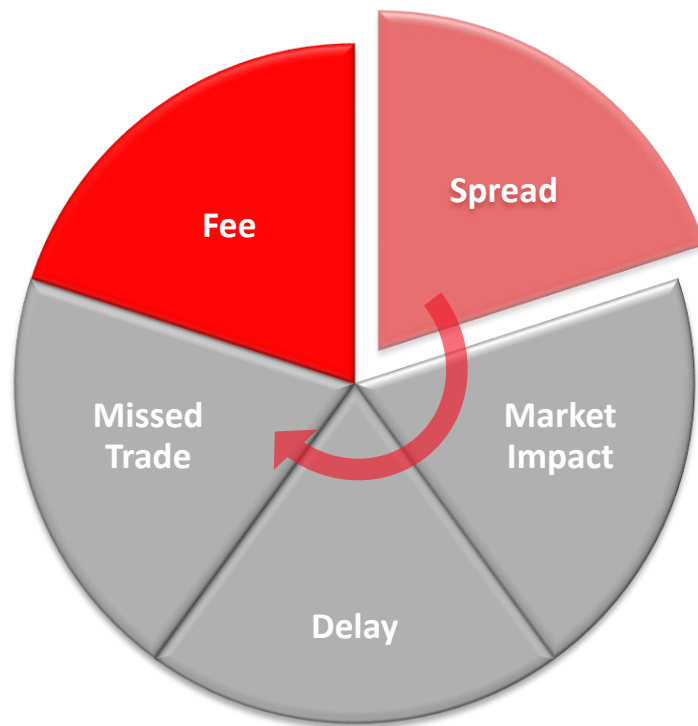
Table 8. Summary of Avg % performance compared to transaction volume for Custodian vs. All Other FX Counterparties, by Fiscal Year

	FY 12/13	FY 13/14	FY 14/15	FY 15/16	FY 16/17	FY 17/18	FY 18/19	FY 19/20	FY 20/21	FY 21/22	FY 21/22	Running Total Average%
ARTISAN GLOBAL VALUE	-0.04%	0.00%	0.02%	-0.01%	-0.02%	-0.03%	-0.03%	0.03%	0.02%	0.00%	-0.06%	-0.01%
BRANDES INVESTMENT PARTNERS				0.21%								0.21%
MACKAY SHIELDS	-0.15%											-0.15%
MORGAN STANLEY INT										0.06%	-0.05%	-0.03%
OBERWEIS INTL OPPORTUNITIES			-0.06%	-0.01%	-0.02%	-0.03%	-0.01%	-0.03%	-0.02%	-0.02%	-0.04%	-0.02%
ORION EURO RE IV										-0.09%	-0.11%	-0.10%
RS INVESTMENT MANAGEMENT, L.P.	-0.08%	-0.11%	-0.10%									-0.09%
RUSSELL CURRENCY HEDGING ACCT				0.04%	0.00%	0.05%	-0.02%					0.03%
RUSSELL INVESTMENT MANAGER RUSSELL 3000	-0.29%	-0.23%										-0.26%
RUSSELL INVESTMENT MANAGERS EAFE & CAD	-0.49%	-0.14%	-0.18%	0.05%	-0.18%	0.00%	-0.16%	-0.15%				-0.19%
RUSSELL INVESTMENTS MSCI ACWI (trmd 11/2012)	-0.14%	0.67%	0.04%									0.06%
RUSSELL INVESTMENTS MSCI ACWI VALUE (trmd 11/2012)	-0.17%		-0.16%									-0.17%
RUSSELL INVESTMENTS OVERLAY ACCOUNT	-0.02%	-0.02%	0.00%	-0.01%	0.00%	0.01%	-0.01%					-0.01%
RUSSELL INVST MSCI EAFE + CAD SMALL CAP	-0.35%		-0.70%		-0.14%	-0.13%	-0.01%					-0.29%
RUSSELL OVERLAY-GAA	-0.05%											-0.05%
RUSSELL OVERLAY-HEDGE FUNDS	0.00%	0.01%	-0.04%	-0.02%								-0.01%
RUSSELL OVERLAY-REAL ESTATE	-0.01%	0.01%	0.01%	0.02%	0.01%	0.00%	-0.01%					0.01%
TERMINATED MANAGER ASSETS				-0.21%	-0.17%		-0.10%	-0.29%				-0.20%
TRANSITION ACCOUNT	-0.10%	0.02%		0.00%	0.20%							-0.02%
TRISTAN CAPITAL PARTNERS				-0.01%	0.06%	-0.06%		-0.03%				-0.01%
TRISTAN EPIISO IV										-0.10%	-0.11%	-0.10%
TRISTAN EPIISO V										-0.19%	-0.11%	-0.13%
WILLIAM BLAIR & COMPANY		0.05%	-0.17%	0.68%	-0.02%	-0.20%						0.07%
Grand Total	-0.02%	-0.04%	-0.03%	-0.05%	-0.04%	-0.05%	-0.03%	-0.02%	-0.01%	-0.01%	-0.04%	-0.02%

Table 9. Investment Manager % performance by Fiscal Year

Appendix A – FX Costs(Spread vs Fee)

- FX Transaction Cost Analysis investigates the true cost to the client when executing a deal.
- FX component implicit in international transactions adds a layer of opacity; FX TCA is a means of adding transparency.



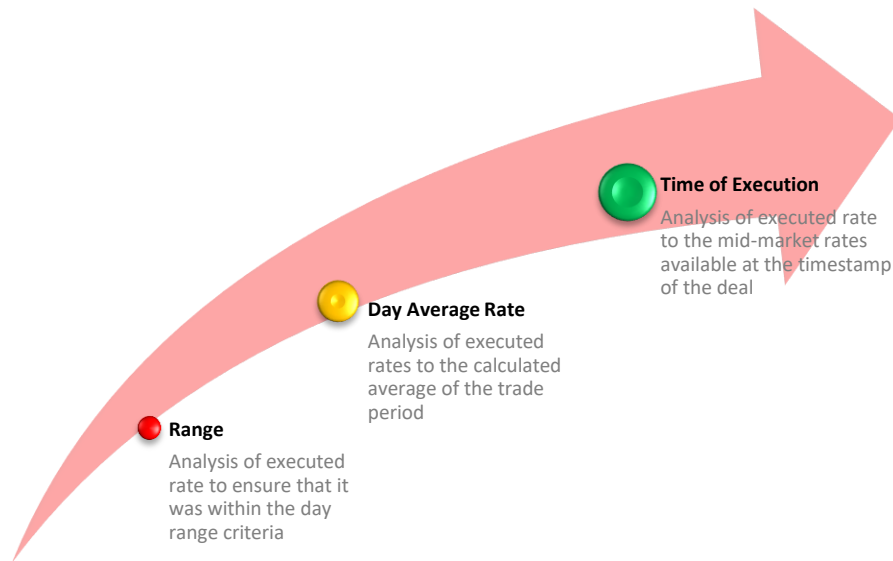
Explicit costs

should be reasonably transparent, consisting of the agent fee plus the spread on the asset. What if the spreads are not readily available and reported, as is the case in currency markets? Quantifying the spread is an Achilles heel for managers

Implicit costs

are generally accepted to be more difficult to ascertain and are generally broken into three areas: market impact, delayed execution, and missed trades. Often used to mask excessive spreads.

Appendix B – Analysis Classification



Range:

Quick snapshot to identify major issues with fee models. Results are only indicative of trading performance within the day range. It is not possible to assess or make strong conclusions on the transaction costs for the portfolio, but it is possible to identify strongly inferior practices.

Day Average Rate:

Trading behavior modeling to identify transaction costs, based on average rate performance as the benchmark. Results are dependent upon a significant sample/population size to justify the assumed average rate distribution.

Time of Execution:

Detailed cost modeling to identify transaction costs based on actual vs. traded as the benchmark. Results from this analysis draw strong conclusions on actual transaction costs but the ability to complete this analysis is limited to the availability of timestamp data from the FX counterparties and custodian.

Appendix C - Analysis Methodology



In this illustration the client is selling Euro's and receiving US Dollar's. The higher the EUR/USD FX rate the more US Dollar's received.

Day Range

- If the exchange rate achieved is greater than 1.2640 then the transaction was executed "Better than the Day Range"
- If the exchange rate achieved is lower than 1.2540 then the transaction was executed "Worse than the Day Range"

Day Average Rate

- Calculated as the average of the high and low exchange rates available on the day. In this example this is the average of 1.2640, 1.2540, is 1.2590.
- If the exchange rate achieved is greater than 1.2590 then the transaction was executed "Better/superior than the Day Average Rate"
- If the exchange rate achieved is lower than 1.2590 then the transaction was executed "Worse/inferior than the Day Average Rate"

Appendix D - Tier Groups, currency classification

Tier 1	High Liquidity	Currency	RIC
		US dollar	USD
		Euro	EUR
		Japanese yen	JPY
		Pound sterling	GBP
		Australian dollar	AUD
		Swiss franc	CHF
		Canadian dollar	CAD
Tier 2	Medium Liquidity	Hong Kong dollar	HKD
		Swedish krona	SEK
		New Zealand dollar	NZD
		Korean won	KRW
		Singapore dollar	SGD
		Norwegian krone	NOK
		Mexican peso	MXN
Tier 3	Low Liquidity	Indian rupee	INR
		Russian rouble	RUB
		Chinese renminbi	CNY
		Polish zloty	PLN
		Turkish lira	TRY
		South African rand	ZAR
		Brazilian real	BRL
		Danish krone	DKK
		New Taiwan dollar	TWD
		Hungarian forint	HUF
		Malaysian ringgit	MYR
		Thai baht	THB
		Czech koruna	CZK
		Philippine peso	PHP
		Chilean peso	CLP
		Indonesian rupiah	IDR
		Israeli new shekel	ILS
		Colombian peso	COP
		Romanian leu	RON
		Saudi riyal	SAR
		Argentine peso	ARS
		Peruvian Nuevo sol	PEN
		Lithuanian litas	LTL

Appendix E – Custodian Execution Models

METHOD	SSGM FXS	Indirect FX Services	The foreign exchange request is made indirectly to SSGM, by email or fax, initiated by the investment manager.
	SSGM FXC	Direct FX Services: FX Connect	The foreign exchange request is made through the online dealing platform (fxconnect).
	SSGM REP	Indirect FX Services; Income Repatriation	The foreign exchange request is automated, typically tax reclaims, dividends, standing instructions.
	SSGM SUBCUSTODIAN	SSGM preferred counterparties	For currencies not traded by SSGM, the foreign exchange request will be sent to the local sub-custodian for execution.
	SSGM P	Direct FX Services; Phone	The foreign exchange request is made directly to SSGM, by phone, initiated by the investment manager.
	SSGM BTB	Direct FX Services	The foreign exchange request is made directly to the custodian, typically through peer to peer networks, or online dealing systems.
TYPE (Hourly/Daily/Restricted)	SSGM HPS (Direct/Indirect)	Hourly Price Service	FX rates are established every hour on the hour between 9am and 4pm in each region. Rates constrained by session Hi-Lo for trading region.
	SSGM SSH	Security Settlements & Holdings	FX rates are generally established at the end of the trading day in the region, with the exception of same day value activity and restricted currencies. Rates constrained by session Hi-Lo for trading region.
	SSGM AIR	Automated Dividend & Interest Income Repatriation Service	FX Rates are established at the beginning of the HK trading day (or at the beginning of trading session for restricted currencies) for all funds regardless of the location of the custody client or SSGM trading desk. Rates established without reference to the hi/lo trading range.