

First Steps in Foreign Exchange Transaction Cost Analysis

Foreign exchange (FX) transactions are significant components of millions of daily financial transactions, yet most currency transactions are rarely measured. Failure to measure transactions makes managing transaction costs difficult, if not impossible. Unlike the equity and fixed income markets where transaction cost analysis is well established, FX transaction measurement is not standard market practice. This article presents two methods for measuring FX transaction costs. The first method is the time of execution method that involves comparing the execution (exchange) rate to the midpoint of the bid and offer rates available in the market at the time of the deal. The second method is the day's average rate method. This method compares the execution rate to the average of the high and low exchange rates for the trade date.

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INTRODUCTION

The foreign exchange (FX) market is enormous, averaging between \$1.9 and \$2.5 trillion per day (Bank for International Settlements 2004; Trenner 2006). FX transactions are significant components of millions of daily banking transactions, international commerce deals, and investments. Despite the importance of FX in world business, the costs of currency transactions are rarely measured. The failure to measure these costs and, worse, failure to manage them, can diminish capital, erode investment results, and increase financing expenses.

Surprisingly, the FX market has eluded the transaction scrutiny experienced by the equity and fixed income markets. A review of services offered by 17 prominent equity transaction cost analysis (TCA) firms revealed that none of the firms offers foreign exchange TCA even though FX is an important element of many international equity transactions.

Equity TCA is sophisticated and complex, measuring trading costs against various well-established benchmarks. In addition to explicit costs like commissions and taxes, equity TCA also attempts to measure implicit costs including opportunity costs, market impact, and timing risk. A similar level of sophistication is desirable for FX. For example, some researchers have suggested measuring transaction costs using futures prices (Aliber *et al.*, 2000). Foreign exchange TCA might evolve to

this level of complexity, but initial TCA is likely to be more modest. This article presents two such methods for easily calculating FX transaction costs.

While transaction costs affect all FX marketplace participants, this article focuses on costs experienced by investment managers (IMs). We begin with reasons for IMs to focus on FX transaction costs, and then present research demonstrating the need to measure them. We conclude by describing two methods for measuring transaction costs. The first method - the time of execution method - involves comparing the execution (exchange) rate to the midpoint of the bid and offer rates available in the market at the time of the deal. The second method - the day's average rate method - compares the execution rate to the average of the high and low exchange rates for the trade date.

WHY MEASURE FX TRANSACTION COSTS?

Regulatory requirements (both national and international) and competition are two reasons to measure, and ultimately manage, FX transaction costs. The regulatory incentive is driven by the United States Securities and Exchange Commission's (SEC) rule requiring "best execution," under which investment professionals must, among other things, seek the best transaction terms reasonably available under the circumstances (Exchange Act Release No. 23170, 1986).

Important in the context of foreign exchange TCA, the

SEC counseled firms to periodically assess their trading performance and improve trading by considering alternative methods. For IMs who trade currencies, these alternative methods might include trading on electronic communication networks, trading with other counterparties instead of the treasury desk of the bank where the clients' assets are custodied, participating in Continuous Linked Settlement (a non-profit organization designed to eliminate settlement risk), using electronic messaging to notify custodians of third-party deals, and evaluating whether some or all of their FX executions should be outsourced to an agency provider.

The European Union's Markets in Financial Instruments Directive (MiFID) contains best execution requirements similar to those for the United States. MiFID requires financial institutions that manage retail and professional accounts to show that they act in the best interests of their clients. In addition, MiFID requires that providers present trade information to their clients, including trade price, trading venue, and time of execution. Although FX is not one of the asset classes affected by regulations that go into effect in 2007, the MiFID components provide the raw data for TCA in foreign exchange.

A full examination of best execution involves the qualitative and quantitative assessment of many factors beyond trade results, including, but not limited to, client trading intentions and requirements, possible venues, and possible trading partners. As part of a comprehensive best execution program, the CFA Institute (CFA Institute Trade Management Guidelines) recommends that investment firms develop an evaluation process in which trade measurement information is collected and analyzed for purposes of measuring performance from period to period; against objectives and benchmarks; and by broker, trading venue, and trading method.

While regulatory requirements might drive the need to measure FX transactions, another compelling reason for IMs to measure costs is the relentless competitive pressure to improve investment results. IMs compete in a business where the difference separating top managers from their peers is measured in basis points. Inferior execution in FX transactions can consume the alpha from a superior investment strategy.

Thus, the motivation for TCA in currency trading is

simple: it's very difficult to control costs that are not measured. Basic FX cost analysis is not complicated, nonetheless has not been widely practiced. One reason is the absence of a central repository for data on FX transaction amounts and rates. Another obstacle is the lack of time stamps on FX deals; although it is not market practice to include them, time stamps are crucial to easy measurement of execution quality.

ANALYSIS OF FOREIGN EXCHANGE TRANSACTIONS

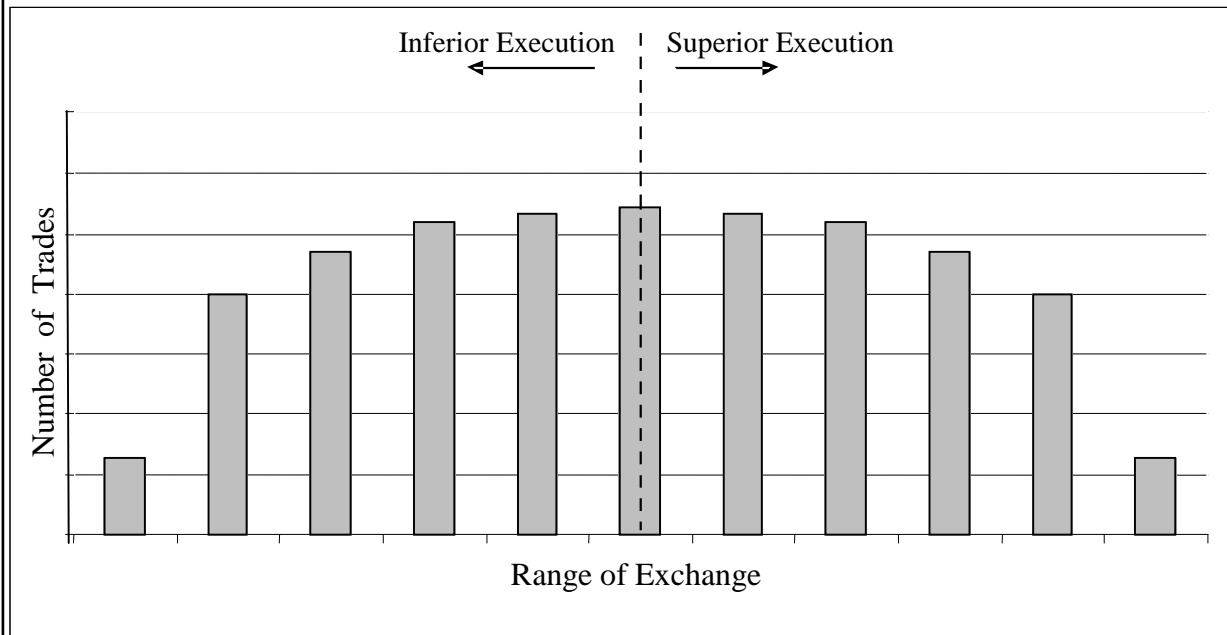
Despite the challenges in measuring costs, Russell Investment Group ("Russell") research shows how costly FX deals can be. In 2004, we analyzed FX transactions executed by our sub advisors to measure the contribution of FX to overall portfolio transaction costs (Collie 2004). We analyzed more than 36,000 transactions with an approximate volume of \$15 billion. The transactions involved both developed and emerging currencies and the experience of a range of investors working from four different base currencies (U.S. dollar, Canadian dollar, euro, and pound sterling).

Because transaction records did not include time stamps, Russell compared the execution rate to the range of prices during the trade day. We developed histograms describing the distribution of execution results, with inferior outcomes at the left of the graph and superior results at the right. We divided the day's range of prices into bands, and then allocated trades to those bands according to where they fell within the day's range. That is, if the investor sold at the worst price of the day, that outcome would be at the left side of the histogram. If the investor received the day's average price, the result would be presented in the middle of the histogram, and if the investor got the day's best price, that outcome would be depicted at the right side of the histogram.

We thought it reasonable to expect execution quality to exhibit randomness; no relative execution rate would be more likely than any other rate. Given the large sample size (36,000) of trades that occurred over more than a year, we expected a symmetrical distribution, with a broad spread between the two extremes (see Figure 1).

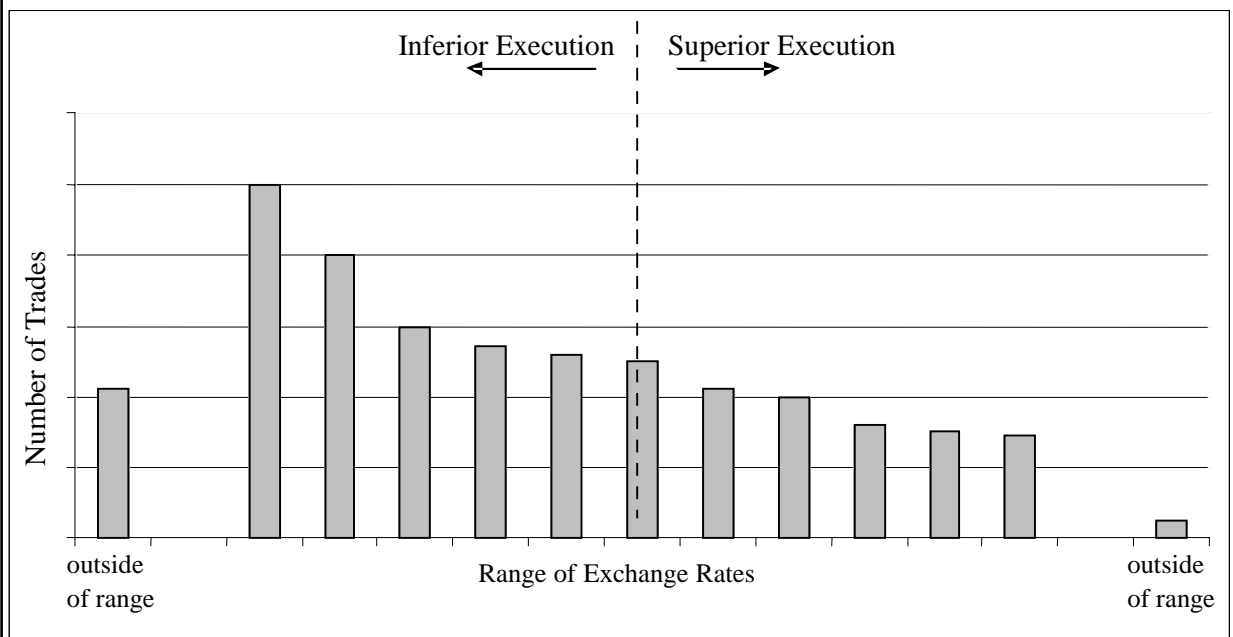
Figure 2 shows the actual distribution of the FX exchange rates in the Russell analysis. The distribution

Figure 1: Theoretical Execution Rate Distribution



Source: Collie, Robert. "It's Time for More Choice in FX."
Russell Investment Group Viewpoint, December 2004.

Figure 2: Actual Execution Rate Distribution



Source: Collie, Robert. "It's Time for More Choice in FX."
Russell Investment Group Viewpoint, December 2004.

was skewed to the worst rates of the day, with very few executions at the best prices of the day. Russell estimated the average cost of the FX executions in this analysis was 9 basis points. This value significantly exceeds most estimates of the FX bid and offer spread. Based on this analysis, Russell took steps to enhance FX execution results, including measuring performance, as described in this article.

The 9 basis point result is consistent with results of other analyses. Record Currency Management (“Record”) found average costs between 10 and 12 basis points, noting that “approximately one half of the audits conducted to date by Record revealed that clients received uncompetitive FX pricing on a routine basis” (Record 2003, 2005).

Execution prices that exceeded the worst price of the day were particularly interesting. We determined that many of these trades were small, approximately one-fifth the size of the average size of other trades. These transactions were often just a few dollars, possibly representing tax credits on dividends or other small cash flows. These trades could be outside of the day’s range because the cash flow occurred late in the day, with the

resulting FX transaction occurring early the next day but recorded with the previous day’s trade date.

To better understand the findings, we examined results for individual investment managers covered in the study. From the set of 36,000 transactions, we selected two subsets of approximately 1,000 trades, each set executed by an investment manager over one year. The execution outcomes from one manager shown in Figure 3 closely matched the distribution shown in Figure 1; those from the second manager presented in Figure 4 resembled the skewed distribution in Figure 2.

From Figures 3 and 4, we concluded that the way in which investment managers handled FX transactions affected relative execution quality. Although the average execution cost is 9 basis points, Figures 3 and 4 demonstrate that the range in execution costs among IMs can be substantial.

Figures 3 and 4 also suggest that IMs differ in the ways they handle FX deals. IMs whose cost distribution resembles Figure 3 probably focus considerable attention upon FX trading. They’re more likely to trade with a variety of counterparties, resulting in competitive

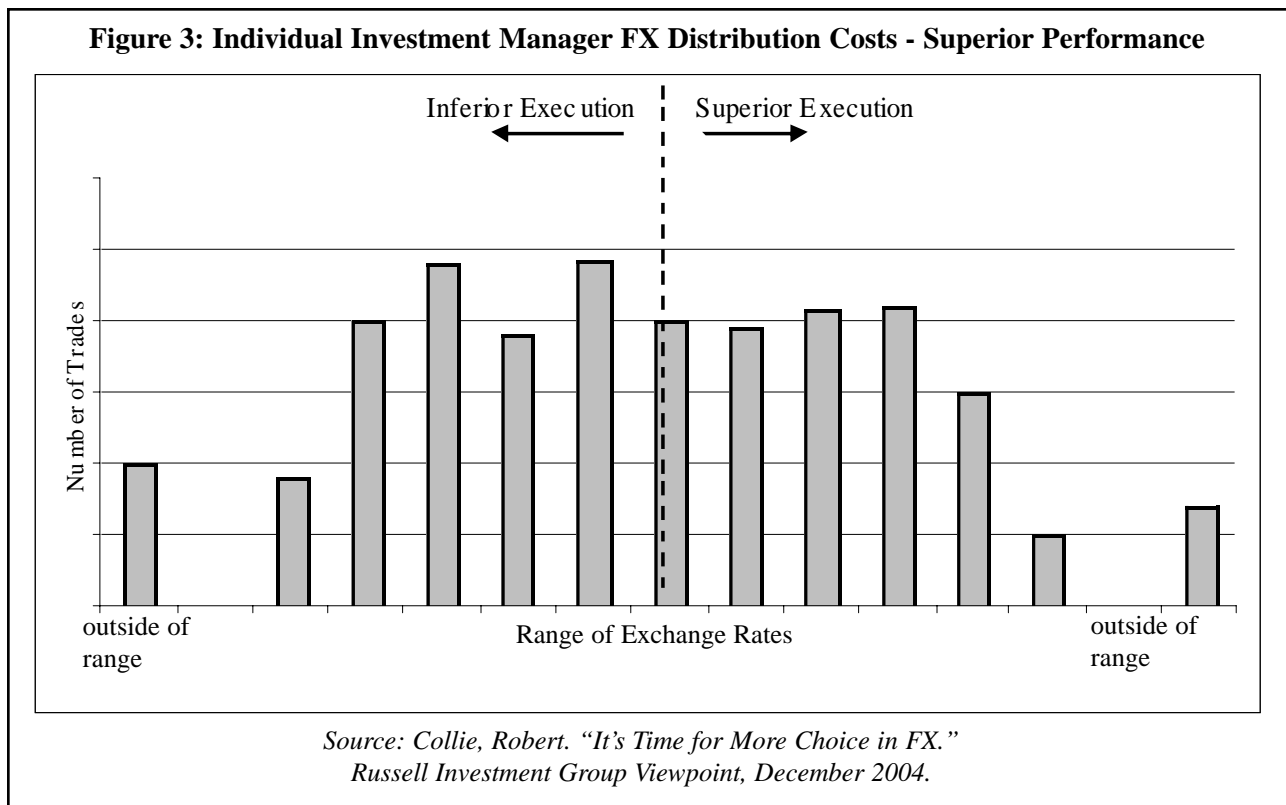
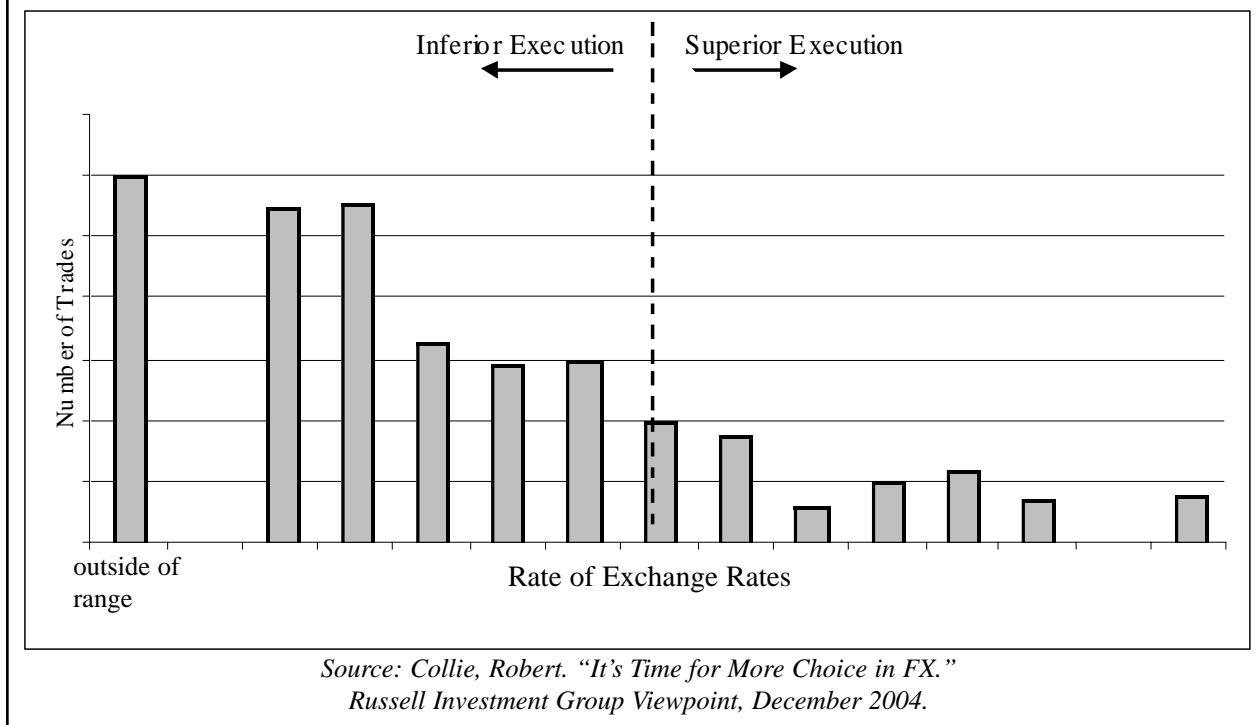


Figure 4: Individual Investment Manager FX Distribution Costs - Inferior Performance



pricing and lower transaction costs. They may also have dedicated FX trading staff and the technical resources to efficiently and cost-effectively execute currency deals.

IMs whose FX cost distribution resembles Figure 4 could be treating FX trading as an administrative task. Rather than being handled in-house with dedicated staff and technical resources, the FX execution is more likely to be delegated to the custodian bank by means of an instruction attached to the trade ticket for the equity or fixed income deal that originated the requirement for the FX transaction.

This FX execution practice affords the client administrative convenience and reduced risk. When the trade is handled by the custodian, the client avoids settlement risk (*i.e.*, that one party to an FX deal will fail to meet its obligation to provide funds as agreed at the time of the trade). Operational risk, due to breakdowns in processes, people, systems, or procedures, is also minimized because only one party is involved in the FX deal.

QUANTITATIVE MEASUREMENT METHODS

While the foregoing analysis is useful for a large vol-

ume of data, it's not as valuable for measuring the execution cost associated with any single trade. We therefore present two methods for calculating performance for FX transactions. The first is the time of execution method. This approach compares the actual execution rate to the midpoint of the bid and offer rates available in the market at the time of execution. The second method is the day's average rate, in which the execution rate is compared to the average of the high and low rates for the day.

Time of Execution Method

The time of execution method compares the execution rate to the rate available in the market at the time of the trade. This method is appealing because it measures the trader's skill in obtaining the best rate available at the time of the deal. We choose the midpoint rate instead of the bid or the offer rates because of the opportunity to match offsetting transactions before going to market. That is, if the trader has an order to buy two million euros and another order to sell two million euros, the trader would match the orders at the midpoint between the bid and offer rates.

If the orders involved a purchase of two million euros and a sale of three million euros, the trader would still

match the two million euros and then sell the remaining one million euros. The buy rate for the two million euros would be the mid-market rate, but the rate for the sell of three million euros would be a weighted average of the mid-market rate for two million euros and the bid price for the sale of one million euros.

Table 1 presents an example of the time of execution method. The deal involves exchanging Canadian dollars (CAD) for one million Swiss francs (CHF). The trader obtained an all-in rate of 1.11252 CHF per CAD (exchange rate of 1.1126 plus forward points of -0.00008). The trader noted the time of the deal, and obtained the market bid and offer rates for CHF and CAD. The interbank convention for quoting these two currencies is in terms of the U.S. dollar (USD). Thus, the trader obtained a bid and offer spread rate of 1.2420 – 1.2422 CHF per USD, and a spread rate of 1.1160 – 1.1162 CAD per USD.

We use the midpoint between the bid and offer rates to calculate the mid-market cross rate between the Swiss francs and Canadian dollars (1.11289 CHF per CAD). This mid-market cross rate represents the best rate the

trader could have obtained. To be comparable to the all-in rate, we adjust the mid-market rate by adding the forward points. We calculate the amount of Canadian dollars the trader had actually paid (CAD 898,860.25) to obtain one million Swiss francs, and compare it to the amount of Canadian dollars (CAD 898,626.00) at the adjusted mid-market cross rate of 1.11281 CHF per CAD.

The trader paid more (CAD 898,860.25) than could have been the case (CAD 898,626.00), achieving an inferior exchange rate compared to the prevailing mid-market rate at the time of execution. We calculate the cost of the FX deal by subtracting the amount of Canadian dollars the trader paid to purchase the Swiss francs from the amount of Swiss francs at the superior mid-market rate, or CAD 234.25. We divide the cost by the amount of Canadian dollars at the mid-market rate and multiply by 10,000 to present the cost in basis points or 2.61.

The calculation of the time of execution method is straightforward, but acquiring the time stamp and the prevailing bid and offer rates can be technically diffi-

Table 1: Time of Execution Method

For illustrative purposes only

Description	Value	Comment
Trade Date	10/02/2006	
Settle Date	10/05/2006	Typical settlement for FX deal based on a security transaction (trade date + 3 days)
Given Currency	CHF	International Standards Organization (ISO) code for Swiss francs
Order	Buy	Order to buy or sell given currency
Given Amount	1,000,000	Amount of given currency to buy
Spot Rate	1.1126	Exchange rate: 1.1126 CHF per CAD
Forward Points	-0.00008	Value added to or subtracted from the spot rate to account for the interest rate differential between two countries
All-in Rate	1.11252	Spot rate + forward points
Alternate Currency	CAD	ISO code for Canadian dollars
Alternate Amount	1,000,000 CHF/1.11252 CHF per CAD = 898,860.25 CAD	Alternate currency equivalent to given currency amount at all-in rate

Table 1 (Continued)

Description	Value	Comment
Time Given Currency	07:29:30 PT	Time that the given currency was executed: local (Pacific Time), or Coordinated Universal Time (UTC), or some other consistent time standard (Eastern Time, for example)
Given Currency Bid – Offer Rates	1.2420 – 1.2422 CHF per USD	The market bid and offer rates for the given currency at the time of execution expressed in terms of the U.S. dollar
Time Alternate Currency	07:29:35 PT	Time that the alternate currency was executed in consistent time standard
Alternate Currency Bid – Offer Rates	1.1160 – 1.1162 CAD per USD	The market bid and offer rates for the given currency at the time of execution expressed in terms of the U.S. dollar
Mid Rate	$((1.2420 + 1.2422)/2) / ((1.1160 + 1.1162)/2) = 1.11289$ CHF per CAD	Midpoint between given and alternate bid and offer rates
Adjusted Mid Rate	$1.11289 - 0.00008 = 1.11281$ CHF per CAD	Mid rate + forward points
Alternate Amount at Adjusted Mid Rate	$1,000,000 \text{ CHF} / 1.11281 \text{ CHF per CAD} = 898,626.00$ CAD	Given amount converted to alternate currency using the adjusted mid rate
Cost	$898,860.25 - 898,626.00 = 234.25$ CAD	If “Order” = Buy: alternate amount – alternate amount at adjusted mid rate If “Order” = Sell: alternate amount at adjusted mid rate – alternate amount (Costs are shown as positive values, gains as negative values)
Cost (basis points)	$234.25 / 898,626.00 \times 10,000 = 2.61$	Cost divided by alternate amount at adjusted mid rate

cult or expensive. No central source of market rates is available; however, EBS and Reuters offer market rate data on a subscription basis. Other technical solutions exist. For example, FX professionals can obtain market rate data from the Reuters 3000 desktop application by using relatively simple computer programming code.

Day’s Average Rate Method

The average rate method is a simple process for evaluating FX transactions. The method involves comparing the execution rate to the midpoint of the day’s high and low rates. The high and low rates are readily available from Reuters or Bloomberg, and the calculation is easy

to perform. Table 2 presents an example of the average rate method.

The average rate method calculation follows the methodology for the time of execution method, except that the alternate amount at the mid-market rate is calculated using the average of the day’s high and low instead of the market rate prevailing in the market at the time of execution.

We compare the execution price to the midpoint of the day’s range (average of the high and low exchange rates from the day). In Table 2, the all-in rate was 1.11252 and the alternate amount was CAD 898,860.25.

The midpoint of the day's high and low values was 1.11575, corresponding to an alternate amount at adjusted mid rate of CAD 896,322.39. The trader bought Swiss francs, so we subtracted the alternate amount at the midpoint from the alternate amount (CAD 898, 860.25 – CAD 896,322.39) = CAD 2,573.86 or 28.3 basis points. The trader bought high and thus incurred a cost.

CONCLUSION

As a first step in developing a TCA methodology for

Table 2: Average Rate Method

For illustrative purposes only

Description	Value	Comment
Trade Date	10/02/2006	
Settle Date	10/05/2006	Typical settlement for FX deal based on a security transaction (trade date + 3 days)
Given Currency	CHF	International Standards Organization (ISO) code for Swiss francs
Order	Buy	Order to buy or sell given currency
Given Amount	1,000,000	Amount of given currency to buy
Spot Rate	1.1126	Exchange rate: 1.1126 CHF per CAD
Forward Points	-0.00008	Value added to or subtracted from the spot rate to account for the interest rate differential between two countries
All-in Rate	1.11252	Spot rate + forward points
Alternate Currency	CAD	ISO code for Canadian dollars
Alternate Amount	1,000,000 CHF/1.11252 CHF per CAD = 898,860.25 CAD	Alternate currency equivalent to given currency amount at all-in rate
Day's High Rate	1.1200 CHF/CAD	The day's high exchange rate
Day's Low Rate	1.1115 CHF/CAD	The day's low exchange rate
Mid Rate	$(1.1115 + 1.1200)/2 = 1.11575$ CHF/CAD	Midpoint between day's high and low rates
Adjusted Mid Rate	$1.11575 - 0.00008 = 1.11567$ CAD/CHF	Mid rate + forward points
Alternate Amount at Adjusted Mid Rate	$1,000,000/1.11567 = 896,322.39$ CAD	Given amount converted to alternate currency using the adjusted mid rate
Cost	$898,860.25 - 896,322.39 = 2,537.86$ CAD	If "Order" = Buy: alternate amount – alternate amount at adjusted mid rate If "Order" = Sell: alternate amount at adjusted mid rate – alternate amount
Cost (basis points)	$2,537.86/896,322.39 \times 10,000 = 28.3$	Cost divided by alternate amount at adjusted mid rate

FX, we described two methods for measuring FX transaction costs. The first method involves comparing the execution rate to the midpoint of the best bid and offer rates available in the market at the time of the deal. The second method involves comparing the execution rate to the average of the high and low rates for the day.

Both methods for measuring FX transaction costs involve easy calculations. The day's average rate method is simpler and requires fewer technological or computer programming resources. The time of execution method, on the other hand, provides a more accurate assessment of the FX trader's ability to obtain the best rate possible at the time of execution. It is also less susceptible to manipulation, as the time stamp provides information for independent verification of the transaction cost. For these reasons, we believe the time of execution method to be superior to the day's average rate method.

The two methods represent preliminary development of TCA for FX transactions. With the increasing importance of FX in commerce and investment management, we anticipate that TCA firms will expand their analysis of transaction costs to include FX, thereby furthering the understanding of transaction costs in the world's largest asset market.

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