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THE IMPACT OF EXCHANGE RATES ON HOTEL OCCUPANCY

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Abstract

In many hospitality and tourism programs, students are usually required to take only the most basic finance course. This can leave them drastically under-prepared for real-world situations. Hospitality and tourism is the world's single largest industry and probably one of the industries most affected by foreign exchange movements. This exposure to foreign exchange movements is magnified by the discretionary nature of hospitality and tourism spending, making the profitability of hospitality providers very sensitive to changes in the exchange rate. This paper explores the effect, if any, of a change in the dollar value of five currencies—UK pound, euro, Canadian dollar, Japanese yen, and Mexican peso—on the hotel occupancy in seven major U.S. tourist destinations—Orlando, Los Angeles, Washington, D.C., New York, San Francisco, Miami, and Las Vegas.

Introduction

While everyone's attention currently is focused on the recession, it should be remembered that we have undergone recessions and expansions throughout modern history. Expansions and recessions are just a fact of the general economic and business cycle. According to the National Bureau of Economic Research (www.nber.org/cycles.html), between 1854 and 2001, the United States experienced 32 business cycles, i.e., expansions and recessions. During those cycles, the recessions lasted an average of 17 months, while the corresponding expansions lasted 38 months. However, over the more recent time period of 1954 to 2001, we have experienced 10 business cycles with the average recession lasting only 10 months and the corresponding expansion lasting 57 months.

When formulating strategic plans, managers and planners look for signs of recession or expansion. If they neglect to forecast and take into account movements in exchange rates, this insidious and volatile economic force might have very detrimental effects on the general profitability of operations. Although recent experience suggests that business changes can sneak up on us, business cycles tend to be longer term and identifiable, allowing us time to craft responses. On the other hand, foreign exchange movements can occur quickly and with little warning. These movements can have a dramatic impact on tourism in general, on hotel occupancy in particular, on our bottom line, and most importantly on our cash flow (Kendall, 2008).

This study examines the impact of foreign exchange movements on hotel occupancy. According to the American Hotel & Lodging Association (www.ahla.com), in 2008 there were 49,505 properties in the United States, with a total of more than 4.6 million guestrooms. These properties generated in excess of $140 billion in sales in 2008.

Let us start by explaining the obvious and maybe not so obvious effects of exchange rates on the hotel industry. In general, there exists an inverse relationship between the value of the dollar and the amount of foreign tourism in the United States. As the value of the dollar increases (i.e., a dollar buys more euros, yen, pounds, or any currency), the opposite happens in foreign countries where it takes more euros, yen, or pounds to buy U.S. dollars. As a result, it becomes more expensive for those travelers to come to the United States.

Consider a ski resort in Salt Lake City, Utah, which is almost 1,000 miles from its closest foreign neighbor. All of its inputs, labor, land, capital, utilities, and even taxes are American. In addition, all of its sales are made in dollars. Does this ski resort in Salt Lake City have a foreign exchange exposure? The answer is a resounding YES. As the value of the U.S. dollar rises and falls against world economies, so do the fortunes of the Salt Lake City ski areas. At one time when the U.S. dollar was strong, a skier in Pittsburgh had the choice of purchasing a seven-day ski package that included flights, hotels, and lift tickets to Salt Lake City for $1,400, while a seven-day ski vacation in Switzerland, including flights, hotels, and lift tickets, cost only $1,295. Where would a skier from Pittsburgh rather go skiing?

The term *perfect storm* is often used when describing our current economic condition. Usually, when an economy goes into recession and its investment opportunities decline, we see a decrease in the value of its currency, which in turn makes vacationing there relatively less expensive for the foreign tourist. However, what we see happening today is not only a recession in the United States, but recessions within every major U.S. trading partner. In times of world instability, a vast majority of the world's citizens view the United States as the "safest haven" for investments; hence, demand for the dollar has increased in relative terms, resulting in a recessionary economy with an appreciating currency (Greenwood, 2007). According to Yahoo Finance, the S&P 500 was at 12,743 on 02/01/08; by 01/30/09, it had fallen to 8000.39. In percentage terms, the S&P 500 had lost 37.2 percent of its value over the year. How does this performance compare to the performance of the dollar over the same time period? Using foreign exchange data retrieved from www.oanda.com/convert/fxhistory, Table 1 shows that over that period, the dollar significantly strengthened against four of the five currencies in this study.

Table 1
Foreign currency per U.S. dollar

Currency	02/01/08	01/30/09	Percent Change
Euro	.6733	.7642	+13.50%
Canadian dollar	.9970	1.218	+22.17%
British pound	.5030	.7029	+39.74%
Japanese yen	106.4	90.22	–15.21%
Mexican peso	10.84	14.10	+30.07%

On average, the U.S. dollar strengthened against the five currencies in this study by more than 18 percent. The current circumstances have combined to create the perfect storm within the hospitality and lodging industry, combining low domestic spending (as the result of the recession) and low international spending (as a result of the appreciated value of the dollar).

While the impact of the economic downturn on the hospitality business is well understood, we will now examine the impact of foreign exchange movements on hotel occupancy so that we may better plan for and react to these changes.

The Model

In the most general terms, currency movements affect exporters and importers in exactly opposite directions. When your currency is strong, exports are hurt because everything you sell is relatively more expensive. Imports are helped because everything you import is relatively less expensive. When your currency turns weak, the opposite is true; everything we sell is relatively cheaper and everything we import is relatively more expensive. Importers are helped by a strong currency and exporters are hurt.

From an economic perspective, hotels' sales to foreign visitors are considered exports. This leads us to the main question of this study: is there a statistically significant relationship between the value of the U.S. dollar and the occupancy level in hotels in the cities mentioned above? It is our belief that hotel occupancy will decline as the U. S. dollar appreciates and will increase as the U.S. dollar depreciates.

Many analysts consider profitability rather than occupancy to be a better measure of hotel performance. High occupancy can be achieved at the expense of heavy discounting (Middleton, 1994; Moutinho & Peel, 1994). Ideally, financial measures such as revenue per available room or profit per available room are superior metrics to occupancy rate, should our job be just to measure accounting performance (Malk & Schmidgall, 1993). We rejected the methodology utilizing financial measures since we felt hotel profitability could not be reliably established within distinct markets such as Orlando or New York for an industry dominated by international hotel chains. As reported by Norkett (1985) and Russo (1991), occupancy performance is an effective surrogate for financial performance, showing a very positive relationship between occupancy and profit. In the end, aggregate market occupancy data is readily available from consistent and reliable sources.

A second source of concern was the seasonality in different markets; relatively fewer rooms may be sold in New York in January than in Salt Lake City. The reverse is also true: relatively fewer rooms would be sold in Salt Lake City in July than in New York. The seasonality problem was a major concern since we felt seasonal occupancy changes could easily dwarf changes resulting from the appreciation or depreciation of the dollar. Seasonality does not occur just according to the four seasons of the year. Take, for example, Walt Disney World, which is extremely busy in June, July, and the first three weeks of August, only to drop way down in September, October, and the early part of November. As we get closer to Christmas, business increases. The period from December 15th to January 5th is their busiest time of year. However, after the first week of January, business plummets until Easter, then rises for a while, and finally falls again until June. Each market that we analyze has different seasonality patterns, and attempting to identify and correct for them would present a major problem. The easiest way to solve the seasonality problem was to aggregate the data on a yearly basis, market by market, eliminating the yearly seasonality. While this substantially decreased the number of data points, we believe it greatly reduced the noise inherent in the data.

For this study, we used simple linear regression (ordinary least squares). Linear regression produces the slope and the intercept of a line that best fits a single set of data, in our case the relationship between hotel occupancy rates and exchange rates, by reducing the sum of the squared differences between each data point and the forecasted line (Neter, Wasserman, & Kunter, 1990).

For our study, we are analyzing the proportion of variation in the hotel occupancy change, our dependent or Y variable, explained by the variation in exchange rate change, our independent or X variable, in the following model:

Y = The dependent variable (hotel occupancy)

X_n = The independent variable (Exchange Rates)

β_0 = The Y axis intercept

β_1 = The slope coefficient of the line

ε = Error term (assumed to have expected value close to 0)

By assuming that the expected value of the error term (ε) is very close to zero, this then becomes the equation for a straight line (Jeffery & Barden, 2007). The only deviation is the subscript (n) on the X variable, which denotes contemporaneous time period. In addition to a contemporaneous comparison, we believe there may very well be a lag period between the actual currency change and the change in hotel occupancy. This expected lag may be as little as three months, but is expected to be closer to one year, as many foreigners plan vacations a year or more in advance.

To measure the success of our model, we used the coefficient of determination, r^2, also known as the "goodness of fit" statistic. The coefficient of determination reports the proportion of the variation in the dependent variable Y as a result of the introduction of the independent variable X. The range of r^2 is from 0 to 1. The closer r^2 is to 1, the more the total variation of the dependent variable Y is explained by the independent variable X. When equal to 1, all of the variation is explained; when equal to 0, none of the variation is explained.

Another statistic, the correlation coefficient or r, is easier to understand. It represents a much broader relationship and indicates how the two time series data move together. If the correlation coefficient is +1, then they move exactly the same; a +10 percent movement in Y is mirrored by a 10 percent movement in X. If the coefficient is –1, then the exact opposite is true. If the coefficient is 0, then there is no relationship at all. Although it would appear that the easiest way to calculate the correlation coefficient is to just take the square root of r^2, this is not the case. The problem lies in the fact the square root of any number can be positive or negative, reflecting the –1 to +1 range of the correlation coefficient discussed above. To correctly determine the correlation between two time series data sets, their covariance must be standardized by dividing it by the standard deviation of each of the time series data:

$$\text{Correlation Coefficient} = \rho_{ab} = \frac{Cov(r_a, r_b)}{\sigma_a, \sigma_b}$$

As we can see from the above equation, the covariance can be negative or positive. Hence, the correlation coefficient can range from -1 to +1. The plus or minus sign is attached to the coefficient according to relationship between two time series data, illustrated by the slope of the fitted regression line.

The Data

Smith Travel Research (STR) is the preeminent provider of a broad spectrum of data, including occupancy rates, for the hotel and lodging industry. Hotel occupancy rates are calculated as the percentage of available room nights sold during any given period. Available room nights is defined as the total number of rooms available for sale multiplied by the number of nights in a given time period. The only adjustment to the STR data was the addition of data for Las Vegas. STR does not survey casinos and hence does not report the total picture for Las Vegas, which is actually the number one city in the United States based on available room nights for 2007. The data for Las Vegas was collected from the

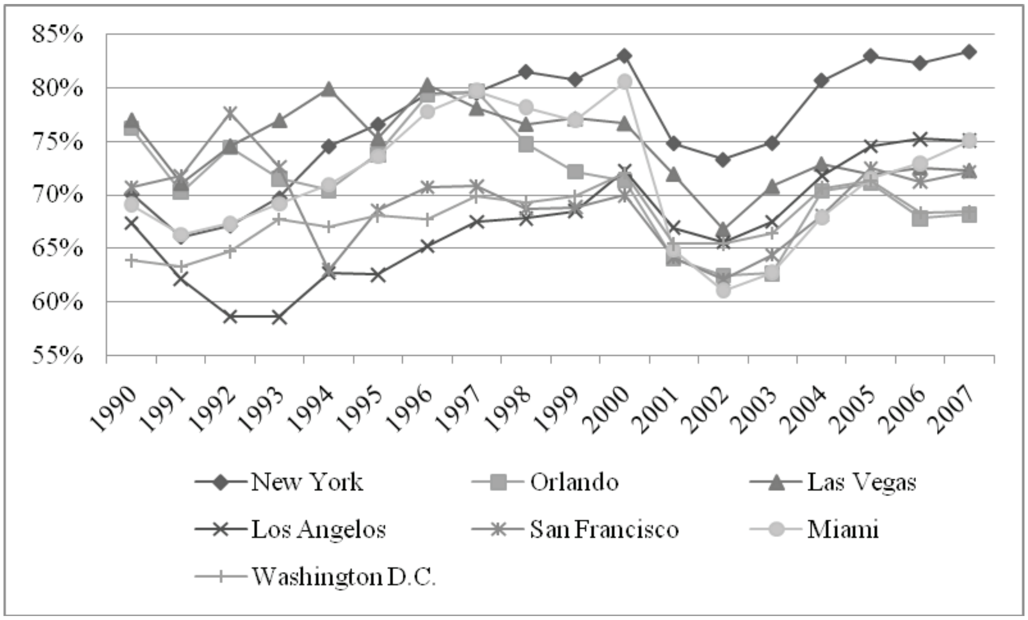
Las Vegas Visitor Profile prepared for the Las Vegas Convention and Visitors Authority by GLS Research. While STR normally sells this information on a market-by-market basis, they graciously agreed to give us data for up to six of the largest U.S. markets listed in Table 2.

Table 2
Largest U.S. hotel markets

Annual Available Room Nights—2007		
1.	Las Vegas, NV	48,525,655
2.	Orlando, FL	40,621,975
3.	Chicago, IL	36,906,535
4.	Los Angeles, CA	33,688,786
5.	Washington, DC	33,668,466
6.	Atlanta, GA	33,067,353
7.	New York, NY	29,688,739
8.	Dallas, TX	26,077,826
9.	Houston, TX	22,371,343
10.	San Diego, CA	19,717,119
11.	Phoenix, AZ	19,202,716
12.	Anaheim, CA	19,169,424
13.	San Francisco, CA	18,343,587
14.	Boston, MA	17,710,834
15.	Miami, FL	15,405,990

The goal of this study was to determine if changes in exchange rates affected hotel occupancy. After discussion with the market research experts at STR, it was determined that, based on the ratio of foreign to domestic visitors, the following six markets would be our best sample: Los Angeles, Orlando, Washington, D.C., New York, San Francisco, and Miami. We then combined the STR data with data we had gathered on Las Vegas. Chart 1 shows the yearly hotel occupancy rates of the seven markets from 1990 to 2007.

Chart 1
Hotel occupancy by city



In addition to the graphical representation above, we also created a correlation matrix of the seven hotel markets (Table 3) to explore how different hotel market occupancies may move together over time. The correlation coefficient represents the relationship of the movement of two variables.

Table 3
Hotel occupancy correlation matrix

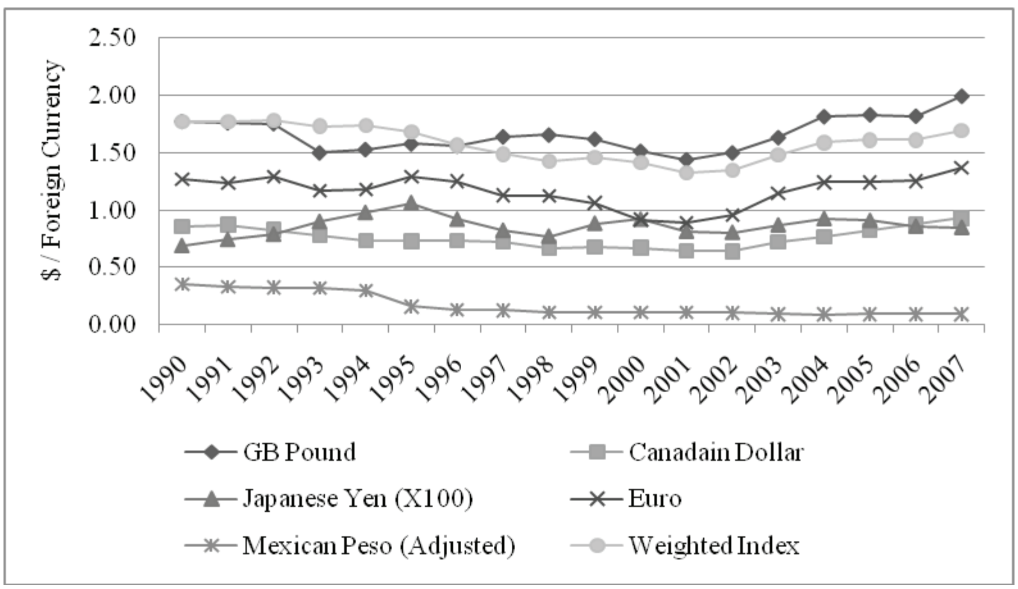
	New York	Orlando	Las Vegas	Los Angeles	Miami	San Francisco	Washington D.C.
New York	1						
Orlando	0.059114	1					
Las Vegas	0.117483	0.78482	1				
Los Angeles	0.821707	–0.19625	–0.23791	1			
Miami	–0.07516	0.561233	0.223742	–0.0377	1		
San Francisco	0.64361	0.680687	0.689972	0.315252	0.344377	1	
Washington	0.855388	0.203156	0.258291	0.583483	0.077965	0.669289	1

The correlation matrix reveals a number of very interesting relationships. As would be expected, the two largest tourist destinations in the United States, Orlando and Las Vegas, are very highly correlated; however, Las Vegas had very little correlation with Miami, Washington, or New York and actually showed a negative correlation with Los Angeles. As we can see from the matrix, New York was highly correlated with both Los

Angeles and Washington, which may be an indication of a relatively high percentage of business versus tourist travelers that tend to be less affected by exchange rates. Miami has a fairly high degree of correlation with the tourist destinations, but very little or negative correlation with the larger business destinations. Lastly, San Francisco has no negative correlation relationships with any city, possibly indicating a relatively stable hotel occupancy that is a balanced mix of tourists and business travelers.

We obtained foreign currency exchange data for the British pound, the Canadian dollar, the Japanese yen, the Mexican peso, and the euro. We also created an equally weighted index of the five currencies. Chart 2 represents the U.S. dollar value of the five currencies over the 17-year sample set.

Chart 2
Dollar value of foreign currencies



We have also constructed a correlation matrix to examine any possible relationship between the movement of these five selected currencies. Table 4 reports the correlation coefficients for the U.S. dollar–valued foreign currencies. As can be seen in the correlation matrix, the U.S. dollar values of the British pound, Canadian dollar, and euro show a high degree of correlation with one another, while the U.S. dollar value of the British pound has a negative correlation with both the Japanese yen and the Mexican peso. The U.S. dollar value of the Canadian dollar also shows a negative correlation with the U.S. dollar value of the yen, but a positive correlation with the U.S. dollar value of the Mexican peso.

Table 4
Correlation matrix of U.S. dollar–valued currency changes

	British Pound	Canadian Dollar	Japanese Yen	Euro	Mexican Peso
British pound	1				
Canadian dollar	0.838927	1			
Japanese yen	–0.25738	–0.22423	1		
Euro	0.731495	0.815378	0.075904	1	
Mexican peso	–0.03566	0.357357	–0.29137	0.310708	1

As would be expected, we see a positive correlation between the British pound, Canadian dollar, and euro, all currencies of very industrialized and somewhat similar economies. By contrast, we see virtually no positive correlation or at times even a negative correlation between these currencies and the Japanese yen and Mexican peso. Mexico and Japan have similar economies from the perspective that they are both export-driven and hence have a very low or negative correlation with the more common consumer-driven economies of Great Britain, Canada, and the countries of Europe. The difference between Japan and Mexico is that Japan is a finished goods exporter that thrives when its currency is undervalued, while Mexico is a raw materials exporter whose main export is oil, which has a relatively stable demand regardless of the exchange rate; hence the fact that, while they both have every little correlation with the other currencies, they also have very little correlation with each other. While these currency relationships are very interesting and do deserve additional attention, they are beyond the scope of this study.

The Results

Table 5 reveals that the city most affected by the exchange rates in the current period is Miami, with four out of the five currencies being significantly related to occupancy rates. Overall, we see a majority (14/25) of the currency/city relationships to be nonsignificant within the context of a contemporaneous time period with the r^2 statistics being less than 0.10. However, the table does reveal that the Mexican peso appears significant for explaining occupancy rate changes in New York, Los Angeles, and Washington, D.C., on a contemporaneous basis.

Table 5
City vs. contemporaneous individual exchange rates

Currency / Results	New York	Orlando	Las Vegas	Los Angeles	Miami	San Francisco	Washington D.C.
Pound X-Coeff.	8.05	2.85	–5.67	17.42	14.03	2.48	1.15
r^2	.042	.007	.053	.258	.288	.0004	.004
F – Stat	.761	.11	.967	5.53	6.49	.065	.073
F – Sign	.402	.73	.339	.013**	.021**	.805	.789
Can. $ X-Coeff.	–8.23	6.44	–4.58	11.30	28.39	–3.35	–6.13
r^2	.016	.013	.012	.032	.40	.002	.045
F – Stat	.267	.217	.209	.617	10.98	.045	.756
F – Sign	.613	.648	.654	.445	<.004***	.566	.397
Yen X-Coeff.	25.16	.428	10.43	1.25	–8.67	16.98	15.39
r^2	.15	.0005	.067	.0004	.038	.065	.285
F – Stat	2.98	.0009	1.14	.007	.636	1.12	6.39
F – Sign	.0998*	.983	.301	.933	.441	.306	.0224**
Peso X-Coeff.	–46.40	14.09	10.07	–36.20	12.51	–14.99	–15.83
r^2	.69	.08	.082	.502	.106	.068	.401
F – Stat	36.1	1.46	1.45	16.8	1.99	1.17	10.85
F – Sign	<.002***	.243	.246	<.001***	.187	.295	<.004***
Euro X-Coeff.	–2.85	13.81	3.60	–.298	16.34	3.19	–2.20
r^2	.004	.14	.019	.0006	.319	.036	.014
F – Stat	.075	2.64	.316	.0009	7.53	.555	.224
F – Sign	.782	.123	.587	.978	.0145**	.467	.642

* Statistically significant at 10% level.

** Statistically significant at 5% level.

*** Statistically significant at 1% level.

Table 6 again reveals that Miami is the city most affected by exchange rates, this time on a one-period lag basis. Also again, the Mexican peso appears to be the currency that affects the most cities. While in this model the yen and euro exchange rate changes become important in explaining occupancy rate changes in both Las Vegas and San Francisco, the pound, peso, and yen are no longer significant for occupancy rate changes in Los Angeles, Miami, and Washington, D.C., respectively.

Table 6
City vs. individual exchange rates with a one-period lag

Currency / Results	New York	Orlando	Las Vegas	Los Angeles	Miami	San Francisco	Washington D.C.
Pound X-Coeff.	3.73	6.07	-1.81	11.30	25.29	5.86	2.51
r^2	.007	.020	.004	.07	.657	.021	.017
F – Stat	.111	.381	.665	1.21	28.7	.345	.274
F – Sign	.790	.54	.804	.28	<.001***	.566	.608
Can. $ X-Coeff.	-18.98	15.59	-6.99	-9.28	36.51	.499	-7.35
r^2	.071	.061	.028	.019	.519	.002	.058
F – Stat	1.17	.999	.438	.293	16.23	.048	.927
F – Sign	.29	.333	.518	.596	<.001***	.843	.353
Yen X-Coeff.	-14.69	17.06	14.93	17.32	-6.99	27.37	16.66
r^2	.160	.097	.14	.087	.0224	.216	.160
F – Stat	2.99	1.63	2.91	1.42	.387	4.12	2.858
F – Sign	.0998*	.221	.138	.249	.546	.06*	.111
Peso X-Coeff.	-42.46	12.64	9.68	-43.53	10.26	-10.98	-16.75
r^2	.62	.26	.075	.71	.071	.036	.300
F – Stat	23.4	1.12	1.24	37.6	1.14	.556	6.31
F – Sign	<.001***	.302	.280	<.001***	.300	.462	.024**
Euro X-Coeff.	.622	26.72	13.55	-3.43	24.04	21.67	2.81
r^2	.004	.49	.236	.007	.602	.219	.022
F – Stat	.069	14.4	4.64	.106	22.7	4.21	.348
F – Sign	.78	.0017***	.047**	.749	<.001***	.058*	.563

* Statistically significant at 10% level.

** Statistically significant at 5% level.

*** Statistically significant at 1% level.

When reviewing the findings of both Tables 5 and 6, we could find no plausible reason that the Mexican peso should be so closely tied with such a majority of the cities and for two distinct regression models. As we know, regressions may indicate correlations, but do not "prove" causality. This close correlation may be due to the fact that while the fluctuation of occupancy levels generally had a range of less than 20 percent over the study period, the majority of the currencies, aside from the Mexican peso, had ranges of more than 50 percent over the same time period and hence showed a lower correlation. The Mexican peso, especially over the last ten years of the study, had a variance that was a factor of ten less than the remaining currencies. With less fluctuation over the same time period, the lower volatility of the peso and the lower volatility of hotel occupancy leads to the reporting of a close relationship when one may not exist.

Table 7 actually gives the best picture of the relationship between currency values and hotel occupancy in the seven markets/cities studied. When all currencies were combined into an equally weighted index or when the five currencies were utilized in a five-factor model, the results became much more significant. In general, this approach more closely resembles a "strong" or "weak" dollar. In four of the cities studied, the weighted index of currencies had a significant relationship with occupancy rates both on a contemporaneous measurement and with a one-period lag, being significant at the 5 percent or better.

Table 7
By city against all currencies at once and an equally weighted index

Currency / Results	New York	Orlando	Las Vegas	Los Angeles	Miami	San Francisco	Washington D.C.
Index no lag							
r^2	.201	.111	.054	.115	.312	.006	.115
F – Stat	4.17	2.05	.91	2.01	7.43	.108	2.08
F – Sign	.057*	.170	.356	.175	.015**	.746	.168
5 Factor no lag							
r^2	.78	.334	.312	.841	.435	.128	.647
F – Stat	8.58	1.12	1.11	13.47	1.81	.357	4.41
F – Sign	<.001***	.367	.400	<.001***	.182	.870	.016**
Index w/ lag							
r^2	.007	.267	.178	.241	.365	.002	.058
F – Stat	.11	5.50	3.21	4.64	8.67	.342	.924
F – Sign	.742	.03**	.093*	.047**	<.01***	.566	.352
5 Factor w/ lag							
r^2	.821	.765	.595	.859	.763	.55	.636
F – Stat	10.02	7.31	3.22	13.5	7.06	2.70	3.85
F – Sign	<.001***	.003***	.049**	>001***	.003***	.079*	.029**

* Statistically significant at 10% level.

** Statistically significant at 5% level.

*** Statistically significant at 1% level.

Conclusions

This study reveals a relationship exists between hotel occupancy and exchange rates. As we break down the results we find that on a contemporaneous basis, only eight out of a possible 35 combinations of currencies and cities showed a statistical significance, with the peso dominating that group. Even with the addition of a one-period lag, only 11 of the 35 combinations reported any statistical significance.

However, when we created an equally weighted index of the currencies or when we used a five-factor model incorporating all of the test currencies, the results were dramatically different. With 24 possible combinations of currencies and cities, 19 showed a statistically significant relationship. The five-factor model with a one-period lag reported that all seven cities showed a statistically significant relationship between currency values and hotel occupancy, with San Francisco at the 10 percent level of significance and the other six cities at the 5 percent level or better.

Business travelers tend to be, if not last-minute travelers, at least shorter-term planners when compared to tourists. It is not unusual for tourists, especially foreign tourists, to plan vacations 12–16 months in advance. Hence, the introduction of the one-year-lag period resulted in greatly increased significance of our model.

Exchange rates do affect hotel occupancy, so we as operators can use this information to better market and plan our operations. A simple step could be to increase advertising budgets in countries with currencies that are strong compared to the dollar. Another step might be to offer additional discounts in countries where currencies are relatively weak. For international hotel chains, the establishment of currency hedges could offset exchange rate risk, and setting up "exposure netting" facilities could make currency fluctuations less important.

As we continue to explore this stream of research, we will attempt to find not only the percentage of tourists compared to non-tourists within each market, but also what countries the tourists represent. This additional information will allow us to better understand the impact of each currency change on each market.

In the end, the better our information, the better our decisions. Even a small advantage is still an advantage. Understanding the impact of foreign currency fluctuations on our business can only help improve our decision-making process.

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