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A Flow-Through Analysis of the US Lodging Industry During the Great Recession

Amrik Singh
University of Denver

Chekitan Dev
Cornell University School of Hotel Administration, csd5@cornell.edu

Robert Mandelbaum
PKF Hospitality Research

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Purpose – The objective of this exploratory study is to investigate the "flow-through" or relationship between top-line measures of hotel operating performance (occupancy, average daily rate and revenue per available room) and bottom-line measures of profitability (gross operating profit and net operating income), before and during the recent great recession.

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Findings – The results show that average daily rate (ADR) and occupancy are significantly and positively related to gross operating profit per available room (GOPPAR) and net operating income per available room (NOIPAR). The evidence indicates that ADR, rather than occupancy, appears to be the stronger predictor and better measure of RevPAR growth and bottom-line profitability. The correlations and explained variances are also higher than those reported in prior research. Flow-through ratios range between 1.83 and 1.91 for NOIPAR, and between 1.55 and 1.65 for GOPPAR, across all chain-scales.

Research limitations/implications – Limitations of this study include the limited number of years in the study period, limited number of hotels in a competitive set, and self-selection of hotels by the researchers.

Practical implications – While ADR and occupancy work in combination to drive profitability, the authors' study shows that ADR is the stronger predictor of profitability. Hotel managers can use flow-through ratios to make financial forecasts, or use them as inputs in valuation models, to forecast future profitability.

Originality/value – This paper extends prior research on the relationship between top-line measures and bottom-line profitability and serves to inform lodging owners, operators and asset managers about flow-through ratios, and how these ratios impact hotel profitability.

Keywords

lodging, bottom-line profitability, flow-through, top-line measures

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Amrik Singh
Fritz Knoebel School of Hospitality Management
University of Denver
Denver, CO 80208
Amrik.Singh@du.edu

Chekitan S. Dev
School of Hotel Administration
Cornell University
Ithaca, NY 14853
csd5@cornell.edu

Robert Mandelbaum
Department of Research
PKF Hospitality Research
Atlanta, GA 30326

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Introduction

The US lodging industry suffered one of its worst declines in operating and financial performance in 2009, a direct result of financial crisis and economic recession. Data from PKF's Trends®in the Hotel Industry showed an average decline of 19.6 percent in revenue per available room (RevPAR) in 2009 from 2008, while profitability as measured by net operating income (NOI) fell a staggering 36.6 percent over the same period (PKF, 2011). This dramatic change in profitability, as a result of the top-line change in RevPAR is a relationship that is of critical importance and interest to the lodging industry, and has recently sparked debate over which driver of RevPAR, occupancy rates or average daily rates (ADRs), has the greatest impact on bottom-line profitability (O'Neill and Mattila, 2006a).

Flow-through analysis, or the relationship between top-line and bottom-line measures for hotels, is of interest to hotel operators, developers, owners, and franchisees to assist them in their decision-making process. The relationship between a key top-line measure, e.g. RevPAR and an important bottom-line measure, e.g. NOI, can be measured using a flow-through ratio (Mandelbaum, 2010). For example, dividing the 37 percent change in NOI by the 20 percent change in RevPAR yields an average flow-through ratio of 1.85 times the RevPAR change. In other words, a hotel manager forecasting an increase (decline) in RevPAR of 10 percent can expect NOI to increase (decline) by 18.5 percent (holding costs constant). Applying the ratio to the Trends® results for the year 2010 produced an identical flow-through ratio of 1.85 times for all hotels (9.8 percent growth in NOI and 5.3 percent growth in RevPAR) (PKF, 2011). Using data from 2004 hotel operating statements, Mandelbaum (2010) showed that on average, property-level NOI changed by a factor of 1.6 times relative to the change in RevPAR from 2003 to 2004. For example, hotels with RevPAR growth in excess of 20 percent (average 27.3 percent) saw their NOI increase a staggering 69.3 percent (2.5 times flow-through). The research also concluded that hotels that achieved the highest growth in NOI were those with RevPAR changes that were driven largely by contributions from higher ADR growth relative to occupancy growth. This finding seems to suggest that ADR is the key driver of RevPAR growth as well as bottom-line profitability. Mandelbaum's (2010) research has also shown that the impact on NOI is lower if hotel operators focus exclusively on either occupancy growth or ADR growth, instead of a combination of occupancy and ADR.

Although there has been some academic research confirming the existence of a positive and significant relationship between the traditional top-line revenue measures (occupancy, ADR, and RevPAR) and bottom-line measures (NOI) (O'Neill and Mattila, 2006a, b) the research has also produced some conflicting results. For example, O'Neill and Mattila (2006a, b) found the relation between ADR and profitability to be either marginally or negatively significant, a finding which they attributed to heavy discounting and price wars that broke out between hotels following the events of 9/11. They concluded that occupancy was the largest contributor to a hotel's NOI and therefore, hotel operators should maximize occupancies given their finding that hotels with higher occupancies are more profitable (O'Neill and Mattila, 2006b). These results appear to be in sharp contrast to those of Mandelbaum (2010) which found hotels with relatively higher ADR driven growth in RevPAR are more profitable in comparison to hotels with occupancy driven growth.

These conflicting results indicate that the relationship between top-line measures and bottom-line profitability raises more questions than answers and thus remains an unresolved empirical question. We believe that a number of factors may contribute to the conflicting findings and explain why further research is needed in this area. First, the measurement of key variables has been inconsistent in previous studies; that is, some variables have been measured in absolute levels while others were measured as percentages within the same model which makes it difficult to interpret the results. For example, NOI may be measured as a ratio (dependent variable) while ADR is measured in absolute dollars (independent variable) in the regression model (O'Neill and Mattilla, 2006b). Second, hotel size has been shown to affect profitability (O'Neill and Mattila, 2006b), but including a measure for hotel size as a control variable may not go far enough to alleviate concerns about the potential for conflicting results. We provide the relevant evidence to this effect in this study.

Scaling all variables in a regression model to control for size or measuring variables in the form of percentage changes not only ensures consistency and comparability between hotels and across time but also eases interpretation of the results. Third, prior research suggests that the impact of top-line measures on bottom-line profitability appears to vary greatly with the economic conditions depending on chain scale and brands (O'Neill and Mattila, 2006a, b; Mattila et al., 2009; O'Neill and Carlback, 2010). We examine the impact of the most recent recession in

our study within this narrow time period. Finally, and perhaps most important, academic research in this area has been largely limited to publicly-available company level data because of a lack of access and availability of property-level financial data. Property-level data was used in this study.

The objective of this exploratory study is to investigate the relationship between top-line measures of hotel operating performance (occupancy, ADR and RevPAR) and bottom-line profitability, as measured by NOI and GOP, before and during the recent recession. Our research differs from prior studies and makes a valuable contribution to the hospitality literature by extending prior research in a number of ways. First, we measure our operating variables using percentage changes, and scale all relevant variables by the number of available rooms for consistency and comparability and to control for any size effect across hotels. Second, we include GOP as an additional profitability measure, given that all of our hotels are managed hotels, based on the notion that GOP is a much more relevant measure than NOI in assessing management's ability to generate profits since fixed charges deducted in deriving NOI are often the prerogative of the property owner. Finally, we provide evidence of the magnitude of the change in NOI or GOP that result from a change in RevPAR.

To our knowledge, other than the work of industry experts such as Mandelbaum (2010), Wilson (2011), and Woods (2009), we are not aware of other hospitality research that has directly focused on the flow-through effects of RevPAR on NOI. We expect that hotel developers, operators, owners and scholars will find this study to be relevant and informative in providing useful and insightful information to help resolve some of the previous conflicting findings and also spark future research in this area given the fundamental importance of this issue to all stakeholders in the lodging industry.

Background information

The relationship or "flow-through" between the top-line measures and bottom-line profitability can best be explained by using a simple case scenario to illustrate the fundamental concepts. This scenario is depicted in Table I.

The base case assumes a 100-room, full-service hotel with a 70 percent occupancy rate and an ADR of $100, resulting in a RevPAR of $70. We assume that food and beverage revenues

are 30 percent of total revenues, direct operating or variable expenses are 45 percent of total expenses and the remaining indirect or fixed costs account for an estimated $3,000 per day which produces a bottom-line NOI of $2,500 per day or a margin of 25 percent in the base case. For simplicity, we make a set of simple assumptions in order to demonstrate changes from the base case. The first change from the base case assumes the entire increase in RevPAR is achieved by a 10 percent growth in occupancy and second, the RevPAR growth is achieved by a 10 percent growth in ADR. From these two changes relative to the base case one can observe the variable impact on the bottom-line NOI from each scenario. It is far more intuitive to analyze and observe changes and the effect of one variable on another, holding constant all other variables (ceteris paribus). We acknowledge that the set of assumptions presented is extreme because in practice both occupancy and ADR are likely to change simultaneously and to varying degrees. Nevertheless, our flow-through illustration is flexible enough for managers to incorporate changes in both occupancy and ADR and to observe their impact on profitability.

Furthermore, managers can certainly reduce expenses by changing the hotel cost structure in response to varying operating environments, but this example ignores such cost control opportunities for the sake of simplicity. Franchise fees and management and incentive fees are also ignored for the same reasons.

In the occupancy change scenario, in which occupancy increases by 10 percent with no change in ADR, RevPAR increases by 10 percent to $77, resulting in a 10 percent increase in room revenue ($7,700) and total revenue ($11,000). Incremental or ancillary revenue is also generated from the additional occupied rooms. More important, an increase in occupancy from selling additional rooms is often associated with incremental variable expenses because of the additional expenses incurred in servicing the occupied rooms, which include the cost of room amenities and cleaning among other costs. With fixed expenses constant, NOI increases from $2,200 to $2,750, a 25 percent change. Dividing this 25 percent change in NOI by the 10 percent change in RevPAR yields a flow-through ratio of 2.5. Alternatively, using absolute dollar changes yields a flow-through ratio of 55 percent which indicates the efficiency to which a dollar of revenue generated at the top-line flows to the bottom-line. In this case, fifty-five cents out of every dollar of sales generated from occupancy flows to the bottom-line.

In contrast, the ADR increase scenario in which ADR increases by 10 percent with no change in occupancy, RevPAR and rooms revenue are identical to those in the previous scenario, but total revenue is slightly lower due to the assumption that no incremental or variable revenue is generated from other, ancillary departments. Moreover, there is no increase in variable expenses associated with any additional rooms sold. With fixed costs constant, the NOI under this scenario is much higher at $2,900 which represents a 27.1 percent margin or a 32 percent growth in NOI. The flow-through ratio in this case is 3.2 times the percent change in RevPAR. Alternatively, using absolute dollar changes, the flow-through efficiency is 100 percent for ADR growth versus a lower 55 percent for occupancy growth due largely to the additional variable costs incurred by putting "more heads in beds." Taken together, this simple example illustrates why ADR driven RevPAR growth can have a much greater impact on NOI than occupancy driven RevPAR growth. Bottom-line profitability is not only higher in dollar amounts but also on a percentage and absolute basis when revenue is ADR-driven. Conversely, the results using the illustration in Table I are similar when we assume declines in occupancy and ADRs.

More important, the flow-through measure is just another proxy for measuring operating leverage because of the practical difficulty in observing and classifying all costs into fixed and variable components based on the standard income statement. Hence, researchers define the degree of operating leverage as an elasticity measure of the percentage change in operating income divided by the percentage change in sales (Lord, 1998). If costs can be broken down into their respective fixed and variable components, then a more accurate measure of the magnitude or degree of operating leverage (DOL) can be derived as the ratio of contribution margin to NOI (Garrison et al., 2012). The higher the ratio, the greater the degree of operating leverage, the higher the ratio of fixed costs relative to variables costs in the cost structure, and the higher the break-even point. A higher DOL implies greater changes or volatility in NOI because fixed costs, assuming constancy, act as leverage to boost profits or magnify losses. In the base case in Table I, the degree of operating leverage is a ratio of 2.5, which is the same ratio obtained when analyzing the percentage change in occupancy. Thus, the magnitude of a 10 percent change in revenue would likely result in a 25 percent change in NOI. However, the example also illustrates that the DOL is not a constant ratio and will continue to decline or increase in correspondence with sales volume and NOI above or below the break-even point. In the next section we examine

the empirical evidence relating to the relationship between top-line and bottom-line measures of hotel performance.

Existing empirical evidence

Industry research

While the research in this area thus far has been limited to a few industry-generated and academic studies, these studies do provide relevant evidence to support the above conceptual considerations. According to a study of chain scale profitability by STR Analytics, average house profit changed at approximately 1.5 times the rate of change in RevPAR, but this ratio varied by chain scale (Wilson, 2011). Luxury hotels were found to achieve the highest change of RevPAR on house profit (GOP), and the midscale segment produced the lowest change. While luxury hotels suffered the greatest decline in RevPAR and house profit during the recession in 2009, these properties rebounded back in 2010 with house profit increases of almost 16 percent from an estimated 8 percent growth in RevPAR. In contrast, midscale hotels, despite producing positive RevPAR growth over the same period, failed to achieve any positive growth in house profit (Wilson, 2011).

In another study, Woods (2009) showed that between 70 percent and 76 percent of the variation in NOI could be explained by changes in real total revenue for various types of hotels, and further documented higher flow-through ratios for full-service properties than limited-service properties. Average flow-through ratios for full-service hotels ranged from a low of 0.9 to a high of 2.3 for various property types and sizes; the limited-service segment saw a range of 1.0 to 1.8. Similarly, using data from 2004, Mandelbaum (2010) found variations in hotel flow-through ratios ranging from a low of 0.6 to a high of 2.8. Hotels with average RevPAR growth of 27.3 percent saw NOI increase by an average of 69.3 percent; properties with average decreases of -5 percent had a corresponding NOI decrease of -14 percent. Focusing on the components that drive RevPAR growth, Mandelbaum (2010) noted that the highest growth in NOI was achieved by those properties whose RevPAR growth was largely driven by ADR. On average, hotels that achieved an average RevPAR growth of 12 percent, using a hybrid growth strategy with 64 percent contribution from ADR and 36 percent from occupancy, attained a 22.5 percent increase in NOI. In contrast, hotels whose REVPAR growth was driven exclusively by either occupancy or ADR increases achieved the lowest gains in NOI implying that hotels should not focus

exclusively on either ADR or occupancy growth but rather a mix of both top-line measures in order to drive RevPAR growth (Mandelbaum, 2010). These latter results are also consistent with prior research that discounting strategies (lowering ADR to boost RevPAR and thus NOI) have a low impact on RevPAR growth and consequently lower NOI (Canina et al., 2004; Enz and Canina, 2006).

Academic research

Academic research has shown that top-line operating ratios (occupancy, ADR, RevPAR) provide managers and owners with critical and valuable information in operating a hotel (Singh and Schmidgall, 2002). While there is some academic research that focuses solely on operating ratios (O'Neill and Mattila, 2004), research that makes the link between these top-line operating metrics and financial performance is still lacking, limited largely by the availability of operating and financial performance data at a property level. Furthermore, research to-date in this area has been produced by a few researchers who have been able to gain access to the data. For example, Xiao et al. (2012) used property-level data from 2,012 hotels over the 2003-2005 recovery period following the previous recession to reveal that hotel owner corporate strategies influenced hotel financial performance. Research by O'Neill and Mattila (2006b) has also produced some contrasting evidence that a hotel's NOI is more closely associated with the occupancy levels rather than the ADR. They noted that hotels with higher occupancies were more profitable during recessionary periods while the impact of ADR depended on the state of the economy. Additional factors influencing NOI included chain scale, location, property age, and brand affiliation. These researchers also noted that their research did not support the widely held industry belief that hotels with higher ADRs and lower occupancies were more profitable. In a subsequent study using the same sample data, O'Neill and Mattila (2006a) observed a lower effect of occupancy on NOI relative to ADR when NOI was measured in dollars. When NOI was measured as a ratio to sales (NOI percent), ADR and rooms revenue were found to be insignificant predictors of NOI. Brand level analysis also revealed a negative relation between ADR and NOI even after removing the effects of branding (O'Neill and Mattila, 2006b). Despite these unexpected results, research on branding reveals significant associations between top-line measures and bottom-line profitability. Brand affiliation accounted for significant variations not only in occupancy, ADR and RevPAR among hotels, but also in relation to NOI with some

brands generating higher NOIs than others (O'Neill and Mattila 2006a, b). Unfortunately the researchers also noted that given the disguised nature of their dataset, they were unable to provide evidence on the effects of the parent company's branding strategy on NOI and therefore, acknowledged the importance and value of such research in providing information to owners, managers, and developers.

Finally, it is well-known that economic conditions drive the performance of the lodging industry (O'Neill and Carlback, 2010). During the most recent recession, ADR driven decreases in revenues, averaging -18.5 percent, drove the greatest declines in NOI (an average of -37.4 percent) in 2009 for all hotels, despite efforts by hoteliers to reduce operating expenses. Given their high operating leverage, full-service hotels, resorts, and convention hotels endured the greatest declines in NOI (over 37 percent) while mid-scale and limited-service hotels suffered lower NOI losses of between -25 percent and -30 percent (PKF, 2010). While the NOI for branded and independent hotels do not show any significant differences during periods of economic expansions, O'Neill and Carlback (2010) show that branded hotels with higher occupancy levels do achieve significantly higher NOIs than do independent hotels during an economic recession. The empirical research also indicates that hotels in the upper quartiles of NOI were significantly more likely to be lower priced mid-scale, limited-service properties; higher priced upscale and luxury full service properties were more likely found in the upper quartiles (Mattila et al., 2009). In the following section, we empirically investigate the relationship between top-line and bottom-line measures to determine how they are linked.

Methods.

The data for this study was provided by PKF Hospitality Research from its Trends® database. The initial dataset comprised 1,581 hotels representing hotels in all 50 PKF Hotel Horizons markets. Each hotel had at least four years of operating and financial data from 2006-2009 on room revenue, total revenue, occupancy, ADR, GOP, and NOI, as well as other characteristics such as management company, brand, chain scale, property type, and markets.

To compile competitive sets, we employed a manual matching process whereby we used Smith Travel Research's (STR) definitions of markets and sub-markets, and for each sub-market

across the US, matched each hotel to a similar property using the following chain scales: luxury, upper upscale, upscale, midscale with food and beverage, mid-scale without food and beverage and extended stay. For example, a luxury hotel located within the Phoenix sub-market of Scottsdale would be matched with other luxury hotels within the same sub-market to create a competitive set of similar hotels. Property matching was performed to control for location because prior research identified location as affecting performance (O'Neill and Mattila, 2006b). We excluded hotels for which we were unable to find matches (465 hotels) and economy hotels (402 hotels). Economy hotels were excluded because we wanted to avoid the problem of having a competitive set of economy hotels that were managed and owned by the same company. The sample was comprised of a mix of hotels with different management/franchise combinations. Our matching process resulted in 714 hotels and 2,142 firm-year observations (2007-2009) that were used in the analysis.

Variables

Once we created our competitive sets, we computed a market RevPAR for each competitive set of hotels in each sub-market and by chain scale. Each hotel's individual RevPAR was then divided by the competitive set market RevPAR to compute an individual hotel's RevPAR index. This RevPAR index computation is identical to the methodology used by STR in generating indices (Occupancy, ADR and RevPAR) for their STAR Reports to which individual hotels subscribe. We computed a number of operating statistics including top-line measures such as occupancy rates, ADR, and RevPAR for all the properties in the sample. Since RevPAR was a critical component in our analysis, and to maintain consistency in terms of its measurement, we also scaled all bottom-line measures by the number of available rooms during the year. These financial measures included total revenue per available room (TRevPAR), gross operating profit per available room (GOPPAR) and NOI per available room (NOIPAR), GOPPAR as a ratio of TRevPAR, and NOIPAR as a percent of TRevPAR. Using available rooms as a scaling variable ensures controls for hotel size. Additionally, we computed percentage changes across time in the top-line and bottom-line measures. Percentage changes are not only useful for evaluating the magnitude of the relative change in the measures, but, more important, facilitating the interpretation and comparison of such measures across time and between hotels of different sizes. We used data from 2006 to compute the change in the measures from 2006 to 2007 in

order to avoid the loss of observations when computing percentage changes. The data were then analyzed to produce various descriptive statistics and to perform the empirical analysis within a multiple regression framework.

Results

Descriptive statistics

The dataset comprised 714 hotels representing 38 different brands and managed by 41 different management companies. Of the 714 hotels, only 21 hotels were independent and the rest (693) were brand-affiliated. The descriptive statistics for the overall sample of 714 hotels are presented in Tables II and III. As can be seen in Table II, there are some variations across the different chain scales and property types with fewer luxury and mid-scale hotels with food and beverage than in other segments. This unequal group distribution could potentially drive the empirical results due to the limited number of observations in those groups.

The economic recession did not begin to affect the lodging industry until the fourth quarter of 2008. While occupancy rates declined slightly, room rates held steady, which led to a slight decline in profitability (Table III). However, as we now know from taking a look back, the lodging industry bore the brunt of the recession in 2009. The precipitous decline in top-line measures, occupancy and room rates, resulted in a dramatic decline in bottom-line profitability. Declines in occupancy and ADR combined produced a 19 percent decline in RevPAR in 2009. The impact of this decline on bottom-line profitability is even more significant as evidenced by the 31 percent decline and 36 percent decline in GOP and NOI, respectively, during the recession. As a percent of total revenues, GOP declined from an average of 44 percent in 2007 to 37 percent in 2009; NOI dropped from an average of 36 percent to 27 percent during the same period. These declines are also consistent with figures reported for all hotels by PKF and STR in their Trends® and Host Study reports (PKF, 2010; Smith Travel Research, 2010). From another perspective, the results show that a 21 percent change in RevPAR from 2007 to 2009 produced a 34 percent decline in GOPPAR, and a 40 percent decline in NOIPAR. In other words, the change in RevPAR had an average flow-through effect of 1.62 times on GOP and 1.90 times on NOI. As we know from looking back at these sobering statistics, many hotels across the country

experienced difficulty generating cash flow to cover debt service requirements or to obtain refinancing as a result of the above declines. Evidence suggests that many hotels that fell into financial distress were either foreclosed on or re-possessed by the lenders (Atlas Hospitality Group, 2010).

Multivariate analysis

Prior research has produced some conflicting findings on the relationship between top-line and bottom-line measures (O'Neill and Mattila, 2006a, b). In order to provide empirical evidence to extend prior industry research on flow-through ratios, we first examined the correlation coefficients between the top- and bottom-line measures to provide some preliminary evidence of the directions of the relationships, and then employed multiple regression analysis to examine this relationship. We winsorized the profitability measures (percent changes in GOPPAR and NOIPAR) at the top and bottom 1 percent of the variables' distributions because we found that extreme outliers (less than 0.7 percent of total observations) were driving some of our results (Barnett and Lewis, 1994). Winsorization is a common strategy employed in accounting research for handling outliers whereby extreme outliers at the tail ends of a data distribution are set equal to some specified percentile of the data (Leone et al., 2012). Instead of dropping these outliers, we replaced the extreme values with values at the top 99 percent and bottom 1 percent of the variable's distribution to mitigate the undue influence of these outliers. The results are unchanged if we winsorize at the top and bottom 0.5 percent of the variable's distribution.

The correlation analysis is presented in Table IV. The results show a positive and significant correlation between percent changes in the top-line measures and bottom-line profitability over the three-year period (2007-2009). More specifically, we observe a stronger and significant positive relationship between ADR and RevPAR, compared to the relation between occupancy and RevPAR. Similarly, changes in ADR have a significantly stronger correlation with changes in GOPPAR and NOIPAR compared with changes in occupancy. These results indicate that ADR appears to be the key driver of RevPAR and bottom-line profitability, providing preliminary evidence consistent with that presented by Mandelbaum (2010). Furthermore, changes in RevPAR and changes in bottom-line profitability are also strongly correlated. These correlations are higher than those reported by O'Neill and Mattila (2006a).

We performed regression analysis for the three-year period combined, by individual year, by chain scale, and with 1 percent and 0.5 percent winsorization. Robust standard errors were used to mitigate any problems with heteroskedasticity. Given the limited number of observations in the Luxury segment (105 observations) and Midscale without F&B (33 observations) segments, we combined the Luxury and Upper Upscale segments into a single segment and the Midscale with F&B and Midscale without F&B into one segment. Our results are unchanged when we analyze the Luxury and Midscale (w/o F&B) segments separately. Table V provides the results of the relationship between the changes in the top-line measures, ADR and occupancy, and changes in bottom-line profitability (changes in NOIPAR in Panel A and changes in GOPPAR in Panel B).

Discussion

A number of initial observations can be made from the regression results in Table V. First, the absolute value of the changes in top-line measures explain between 65 percent and 85 percent of the variations in bottom-line NOIPAR, and 80 percent-90 percent of the changes in GOPPAR. For example, for all hotels, a 1 percent change in ADR yields a 1.9 percent change in NOI, and an estimated 1.6 percent change in GOP, while the same magnitude change in occupancy results in a 1.8 percent NOI change and 1.6 percent change in GOP. The explained variance is relatively higher for GOPPAR than NOIPAR largely because additional fixed costs such as property taxes and insurance are subtracted from GOP to arrive at NOI. Second, changes in occupancy and ADR by chainscale are all significantly positively related to profitability. Third, the results show a significantly positive relationship between top-line and bottom-line measures when they are measured as percentage changes. Fourth, the results indicate that ADR not only has a significantly positive relationship with bottom-line NOIPAR, but it is also more precise as evidenced by smaller errors and large critical t-values. When we ran the regressions by year, we found ADR to have a greater impact on NOIPAR with larger coefficients and t-statistics. Only in the upscale segment do we observe occupancy changes having larger regression values and larger variances. Our findings on ADR also differ from those of O'Neill and Mattila (2006a, b) and are consistent with the industry research in that they indicate that ADR is a better predictor of profitability than occupancy. Fifth, the results for GOPPAR again

show that ADR is still the better measure across all chain scales, even though occupancy values are larger than the ADR values in the Luxury/Upper Upscale and Upscale chain scales. The regression values for GOPPAR in Panel B are also smaller than those of NOIPAR in Panel A. This finding exists because the computation of NOI includes additional deductions for various fixed charges, which would magnify the impact on the bottom-line. Accounting for these additional fixed charges also explains why the relationship between RevPAR and GOPPAR is stronger than the relation between RevPAR and NOIPAR.

To provide additional insights into the relationship between the top-line measures and bottom-line profitability, we also computed the standardized regression coefficients or beta coefficients. These coefficients are measured in standard deviations and allow us to compare the relative strength of the predictors (ADR and occupancy) with each other within the model. When we perform this analysis, we find that ADR had the largest beta coefficient in all of the regressions in Table V except for the Upscale segment. For all hotels, a one standard deviation increase in ADR leads to a 0.59 standard deviation increase in predicted NOI, with other variables in the model held constant. Similarly, a one standard deviation increase in ADR leads to a 0.62 standard deviation increase in predicted GOP, with other variables held constant. In contrast, occupancy produces standard deviation increases of 0.52 and 0.58, respectively, for NOI and GOP. Given the small absolute differences in the relative strength of the beta coefficients, our results suggest both ADR and Occupancy are important determinants of bottom-line profitability with ADR having a stronger impact on the bottom-line than does occupancy.

Similar results are obtained when we use alternative measures of the predictive strengths of occupancy and ADR because of the limitations associated with using beta coefficients. These alternative measures included structure coefficients and squared semi-partial correlations (Myers et al., 2006). Structure coefficients indicate the bivariate relationship between a predictor and the observed effect without the influence of other predictors in the model. On the other hand, the squared semi-partial correlation measures the unique contributions of a predictor after the contributions of other predictors have been controlled (Myers et al., 2006). In all of our models we find the average structure coefficients for ADR (0.80) to be higher compared to occupancy (0.73) across all models in Table V. When assessing the relationship between top-line metrics and NOI, we find a higher squared semi-partial correlation of 0.26 for occupancy versus 0.33 for

ADR. GOP produced a squared semi-partial correlation of 0.32 as opposed to 0.37 for ADR. These results are similar to those derived from evaluating the impact of ADR (42 percent unique contribution) and occupancy (39 percent unique contribution) on RevPAR. Taken together, these results are consistent with the conclusion that of ADR and occupancy, ADR is the better predictor, uniquely explaining a greater amount of the variance in the dependent variables.

Table VI presents the computation of the flow-through ratios derived by regressing changes in NOI over changes in RevPAR. The results in Table VI show remarkable similarity in the size of the flow-through ratios for all hotels and by chain scale. The regressions explained between 81 percent and 90 percent of the variation in GOPPAR compared to a wider range of 62 percent to 86 percent variation observed for NOIPAR. There is a significantly positive relation between RevPAR and bottom-line profitability, consistent with the findings of O'Neill and Mattila (2006b). Furthermore, the flow-through coefficients for GOPPAR are also smaller than for NOIPAR. This result is explained by higher operating leverage and additional fixed charges increasing the variability of income and adding more "noise," thereby reducing predictive power. Flow-through ratios range between 1.83 and 1.91 for NOIPAR and between 1.55 and 1.65 for GOPPAR across all chain scales. The flow-through results for GOPPAR are also consistent with those of STR Analytics in terms of the magnitude of the ratios and indicating that the impact on luxury hotels was greater than other segments (Wilson, 2011). When we run the regression for all three years combined, the overall flow-through ratio for all hotels is estimated at 1.88 for NOIPAR and 1.59 for GOPPAR, which implies that a 10 percent change in RevPAR will lead to a 19 percent change NOIPAR and 16 percent in GOPPAR. When the regression analysis was performed by year, we observed a decline in the flow-through ratios for NOIPAR from 1.93 before the recession in 2007 to 1.78 in 2009 during the recession. On the other hand, the flow-through ratios for GOPPAR increased from 1.58 in 2007 to 1.66 in 2009. The lower flow-through for NOI implies that hotel managers reduced operating leverage by reducing some fixed charges while the higher GOP flow-through implies that some departmental-level or undistributed operating expenses may have increased as well.

Evidence on the conflicting findings of an inverse ADR and NOI relationship

In this section, we provide some additional evidence on the finding of a marginal or significantly negative relationship between ADR and NOI ratio (O'Neill and Mattila, 2006a, b).

In their analysis, O'Neill and Mattila (2006a, b) included the number of rooms as an independent variable to control for the effect of size on profitability. We replicated their regression of top-line measures on the NOI percentage using our sample of hotels. We first ran a correlation analysis and found a significantly negative correlation between ADR and number of rooms with the NOI percent, and a significant positive correlation between the number of rooms and ADR. Given this finding, we then sorted our data into four quartiles by the NOI ratio and found that hotels in quartile 1 were the largest hotels with the highest ADR, the lowest occupancy rates and the lowest NOI. This finding is consistent with those of O'Neill and Mattila (2006a) that hotels with higher ADRs had lower bottom-line percentages. In contrast, the smallest properties in quartile 4 had the lowest ADR, highest occupancy rates and highest NOI ratios. Based on this preliminary finding, we make the important observation that the negative correlation between ADR and NOI percent appears to be induced by a failure to adequately control for hotel size in the dependent variable (NOI percent) and implies that the number of rooms may be a redundant variable.

To shed further light on this preliminary evidence, we performed a regression analysis where we first regressed the NOI percent on ADR, occupancy, and the number of rooms. Based on our analysis, we made the following observations. While the overall relationship between ADR and NOI percent appears to be negatively correlated, we find the relationship varies by chain scale. The relationship between ADR and NOI percent in the Luxury/Upper Upscale was not significant, was positive and significant in the Upscale and Midscale segments, and significantly negative in the Extended Stay segment. The relationship between number of rooms and the NOI ratio is largely insignificant in all chain scales except in the Upscale segment, where it is negative and significant at the 0.05 level.

Second, when we excluded the number of rooms as an explanatory variable, none of the regression results changed. Hence, we conclude that the number of rooms was a redundant variable in the regressions and did not provide any incremental information or explained any additional variance beyond what ADR yielded. In addition, the failure to adequately control for size in the dependent variable, given the difference in how it is measured from the other explanatory variables, can yield conflicting results. Instead of using the NOI ratio as a dependent variable, we chose to use percent changes in our regressions, and as our main results in Table V indicate, changes in ADR are significantly and positively related to changes in NOI.

Furthermore, we explain more than 70 percent of the variation in NOI and 80 percent in GOP with just ADR and Occupancy, a substantially higher result than in previous research.

Conclusions

The objective of this study was to investigate the relationship between top-line revenue measures and bottom-line profitability measures over the three year period from 2007 to 2009, before and during the recent recession. The analysis was performed in a number of different ways that generated some useful, informative and relevant insights into the performance of hotels over the three year period. First, our analysis provided evidence of a significantly positive relation between top-line measures and bottom-line profitability. All three top-line measures – occupancy, ADR and RevPAR – have significant, positive relationships with GOPPAR and NOIPAR. The correlations and explained variations are also higher than those reported in prior research. Our results show that both occupancy and ADR are important drivers of RevPAR growth and bottom-line profitability. More specifically, ADR is a stronger predictor than occupancy in driving RevPAR growth and bottom-line profitability. These results are consistent with industry belief and practice. In addition, some of the results of this study differ with prior academic research with respect to the finding of a positive relation between ADR and NOI (O'Neill and Mattila, 2006a, b). Our results also extend prior research by providing evidence on drivers of GOPPAR as a bottom-line profitability measure for managed hotels, indicating that the effects are similar to NOI but at a lower degree of magnitude. As an additional insight into the relationship between top-line and bottom-line measures, we derived RevPAR flow-through ratios of between 1.83 and 1.91 for NOIPAR and between 1.55 and 1.65 for GOPPAR across all chain scales. These results indicate that changes in RevPAR at the top-line have a significant impact on bottom-line profitability. Although there are no industry norms to indicate what a flow-through ratio should be for a hotel, previous research by STR Analytics and PKF (Mandelbaum, 2010, Wilson, 2011) indicates an overall industry average between 1.5 and 1.6 times the change in RevPAR.

Practical Implications

The results of this study also yield a number of practical implications for managers. First, managers should not exclusively focus on ADR or occupancy in driving profitability. Hotel managers should employ both measures in combination to drive profitability, but ADR should be the key driver of that impact. For example, if a 10 percent growth in RevPAR is expected, then that growth should perhaps be driven by an estimated 6 percent change in ADR and 4 percent change in occupancy, i.e. a 60 percent contribution from ADR and a 40 percent contribution from occupancy. Mandelbaum (2010) noted that the greatest growth in NOI was achieved by those hotels where ADR was the primary driver of RevPAR growth. He also suggested that each hotel must find the right combination of these RevPAR drivers to maximize its profits. Second, this study shows how the flow-through ratio can be easily derived without the necessity of detailed financial statements. Only year-to-year percentage changes in the top-line and bottom-line measures are needed as inputs in the computations. These flow-through ratios can then be used to make financial forecasts or used as inputs in valuations models to forecast future profitability. Since flow-through ratios are not constant, managers must keep track of these ratios over time to assess their sensitivity and impact on profitability when they make decisions to change their cost structure in response to changing economic conditions.

The application of the flow-through concept and result of this study are also useful in teaching courses in revenue management, managerial accounting and valuation. The illustration used in Table I can be expanded to analyze the sensitivity of changing both ADR and occupancy, and including additional variable costs such as franchise and management fees, and additional revenue sources. It would be a useful exercise in revenue management courses for students to assess the impact of changes in top-line performance on the bottom-line profitability. Flow-through would also be a valuable extension of break-even analysis to assess changes in the degree of operating leverage in response to changes in cost structure (fixed cost relative to variable cost) as the hotel moves further away from its break-even point. Finally, flow-through would be a useful short-term forecasting tool in projecting NOI over multiple years for use in discounted cash flow analysis in valuation courses.

Further industry and academic research is needed in this area employing larger sample sizes within each chain scale to provide managers with more practical, useful and relevant information on the use of operating leverage as a strategy in response to changing economic

conditions. Such research would also require detailed income statement data over multiple years that would permit the use of regression analysis to disaggregate costs into their variable and fixed components in order to derive a more accurate measure of operating leverage.

In this case, break-even analysis would be a useful extension of this study to investigate operating leverage as a measure of business risk. Future research can also extend this study using similar methodology and more comprehensive competitive set data to investigate whether these results hold in the period after the recession. This work should include analysis of the flow-through effect at various levels of occupancy. The flow-through for a hotel that achieves a RevPAR gain of 8 percent from a base of 50 percent occupancy, will most likely differ from a hotel with an 8 percent gain in RevPAR from a base occupancy of 75 percent based on the assumption that at higher levels of occupancy, only incremental variable expenses are incurred once fixed costs are covered. Researchers should also be careful to measure all variables consistently and to ensure that hotel size is adequately controlled in their analysis to avoid conflicting results.

Limitations

Our analysis is limited to those hotel companies that participate in PKF's Trends® program as well as the short three-year period used in this study. Another limitation we faced in our matching process was the inability to increase the number of hotels in the competitive sets. For example, in many sub-markets we were able to only match two properties within a chain scale. In practice, hotel managers in consultation with owners generally select about four-six hotels that form their primary competitive set. Furthermore, when faced with a limited number of competitive hotels in a sub-market, managers would most likely add hotels that are one notch above or below their respective chain scale.

References

Atlas Hospitality Group (2010), *Atlas California Distressed Hotels Survey*, Atlas Hospitality Group, Irvine, CA, 6 January.

Barnett, V. and Lewis, T. (1994), *Outliers in Statistical Data*, 3rd ed., John Wiley, Chichester.

Canina, L., Enz, C. and Lomanno, M. (2004), "Why discounting doesn't work", *The Center for Hospitality Research, Cornell University School of Hotel Administration, Vol. 4* No. 7.

Enz, C. and Canina, L. (2006), "Why discounting still doesn't work: a pricing update", *The Center for Hospitality Research, Cornell University School of Hotel Administration, Vol. 6* No. 2.

Garrison, R., Noreen, E. and Brewer, P. (2012), *Managerial Accounting*, 14th ed., McGraw-Hill Irwin, New York, NY, pp. 200-203.

Leone, A., Minutti-Meza, M. and Wasley, C. (2012), "*Influential observations and inference in accounting research*", working paper, University of Miami, Miami, FL.

Lord, R. (1998), "Properties of time-series estimates of degree of leverage measures", *The Financial Review, Vol. 33* No. 2, pp. 69-84.

Mandelbaum, R. (2010), "How profitable will your NOI be in 2011", *Lodging, November*, pp. 26-27.

Mattila, A., O'Neill, J. and Hanson, B. (2009), "An analysis of characteristics of U.S. hotels based on upper and lower quartile net operating income*", The Real Estate Finance Journal, Summer*, pp. 50-54.

Myers, L., Gamst, G. and Guarino, A. (2006), *Applied Multivariate Research: Design and Interpretation*, Sage Publications, Thousand Oaks, CA, pp. 162-170.

O'Neill, J. and Carlback, M. (2010), "Do brands matter? A comparison of branded and independent hotels' performance during a full economic cycle", *International Journal of Hospitality Management, Vol. 30* No. 3, pp. 515-521.

O'Neill, J. and Mattila, A. (2004), "Hotel branding strategy: its relationship to guest satisfaction and room revenue", *Journal of Hospitality & Tourism Research, Vol. 28* No. 2, pp. 156-165.

O'Neill, J. and Mattila, A. (2006a), "The debate regarding profitability: hotel unit and hotel brand revenue and profit relationships*", Journal of Travel & Tourism Marketing, Vol. 21* Nos 2/3, pp. 131-135.

O'Neill, J. and Mattila, A. (2006b), "Strategic hotel development and positioning: the effects of revenue drivers on profitability", *Cornell Hotel and Restaurant Administration Quarterly, Vol. 47* No. 2, pp. 146-154.

PKF Hospitality Research (2010), *Trends® in the Hotel Industry, 2009,* PKF Hospitality Research, Atlanta, GA.

PKF Hospitality Research (2011), *Trends® in the Hotel Industry, 2010,* PKF Hospitality Research, Atlanta, GA.

Singh, A.J. and Schmidgall, R. (2002), "Analysis of financial ratios commonly used by US lodging financial executives", *Journal of Leisure Property, Vol. 2* No. 3, pp. 201-213.

Smith Travel Research (2010), *HOST 2010: US Hotel Operating Statistics for the Year 2009,* Smith Travel Research, Hendersonville, TN.

Wilson, C. (2011), *Chain Scale Profitability: 2010 vs. 2009, HOST 2011 US Hotel Operating Statistics for the Year 2010,* Smith Travel Research, Hendersonville, TN, pp. 11-12.

Woods, R. (2009), "Flow-through & the profit squeeze for the U.S. lodging industry – Hotel Investment Strategies, LLC., New York, NY", *Hotel Portfolio Topics, Vol. 4* No. 1.

Xiao, Q., O'Neill, J. and Mattila, A. (2012), "The role of hotel owners: the influence of corporate strategies on hotel performance", *International Journal of Contemporary Hospitality Management,* Vol. 24 No. 1, pp. 122-139.

Table 1. Flow-through effect of RevPAR on NOI

Base Case		Occupancy increases 10 per cent		ADR increases 10 per cent	
Rooms	100	Rooms	100	Rooms	100
Occupancy	70.00%	Occupancy	77.00%	Occupancy	70.00%
ADR	$100.00	ADR	$100.00	ADR	$110.00
RevPAR	$70.00	RevPAR	$77.00	RevPAR	$77.00
Total room revenue	$ 7,000	Total room revenue	$ 7,700	Total room revenue	$ 7,700
F& B & other revenue	$ 3,000	F& B & other revenue	$ 3,300	F& B & other revenue	$ 3,000
Total revenue	$10,000	Total revenue	$11,000	Total revenue	$ 10,700
Variable expenses	$ 4,500	Variable expenses	$ 4,950	Variable expenses	$ 4,500
Contribution margin	$ 5,500	Contribution margin	$ 6,050	Contribution margin	$ 6,200
Fixed expenses	$ 3,300	Fixed expenses	$ 3,300	Fixed expenses	$ 3,300
Total expenses	$ 7,800	Total expenses	$ 8,250	Total expenses	$ 7,800
NOI	$ 2,200	NOI	$ 2,750	NOI	$ 2,900
NOI margin	22.0%	NOI Margin	25%	NOI Margin	27.1%
Flow-through (% Δ)			2.5		3.2
Flow-through (abs. $Δ)			55%		100%

Notes: Numbers used in the table are for illustration purposes only and do not reflect actual results of any hotel. Flow-through percentage change is computed as percentage change in NOI divided by percentage in rooms revenue or RevPAR from the base case. Flow-through, using absolute dollar changes is computed as the dollar difference in NOI divided by the dollar difference in total revenue

Table 2. Hotel frequency statistics.

	Number of hotels	Observations	Percentage
Affiliation			
Independent	21	63	2.9
Branded	693	2,079	97.1
Total	714	2,142	
Chainscale			
Luxury	35	105	4.9
Upper upscale	187	561	26.2
Upscale	171	513	23.9
Midscale w/out F&B	143	429	20.1
Midscale w/F&B	11	33	1.5
Extended stay	167	501	23.4

Table 3. Hotel operating statistics, 2007-2009

Characteristics[a]	2007		2008		2009	
	Mean	Median	Mean	Median	Mean	Median
Average number of rooms	252	149	252	151	252	149
Occupancy rate (%)	71.2	71.6	69.0	69.3	63.8	64.2
Percentage Δ in occupancy			−3.1	−3.2	−7.5	−7.4
Average daily rate (ADR)	$126.9	$115.2	$127.1	$114.7	$110.6	$101.4
Percentage Δ in ADR			0.2	−0.4	−13	−11.6
RevPAR	$91.8	$81.7	$89.8	$78.7	$72.5	$64.2
Percentage Δ in RevPAR			−2.2	−3.7	−19.3	−18.4
TRevPAR	$118.7	$92.6	$116.0	$87.8	$94.1	$72.3
Percentage Δ in TRevPAR			−2.3	−5.2	−18.9	−17.7
GOPPAR	$49.4	$40.4	$46.8	$37.7	$32.5	$25.9
Percentage Δ in GOPPAR			−5.3	−6.7	−30.6	−31.3
GOPPAR/TRevPAR (%)	44.4	44.6	43.0	43.7	36.7	37.4
NOIPAR	$39.6	$33.2	$37.4	$30.3	$23.8	$19.3
Percentage Δ in NOIPAR			−5.6	−8.7	−36.4	−36.3
NOIPAR/TRevPAR (%)	36.3	36.4	34.8	35.2	27.1	28.0

Notes: [a] $n = 714$; Revenue per available room (RevPAR); Total revenue per available room (TRevPAR); Gross operating profit per available room (GOPPAR); Net operating income per available room (NOIPAR); Net operating income is defined as income before deduction for capital reserves, rent, interest, income taxes, depreciation and amortization

Table 4. Correlations between top-line and bottom-line measures, (% changes).

	Occupancy	ADR	RevPAR	TRevPAR	GOPPAR	NOIPAR
Occupancy	1.000					
ADR	0.182*	1.000				
RevPAR	0.756*	0.770*	1.000			
TrevPAR	0.713*	0.720*	0.981*	1.000		
GOPPAR	0.694*	0.725*	0.929*	0.918*	1.000	
NOIPAR	0.628*	0.682*	0.854*	0.798*	0.918*	1.000

Note: *Pearson's correlation $p < 0.01$

Table 5. Regression analysis of relationship between top-line and bottom-line measures.

	All Hotels	Heteroskedasticity-robust *t*-stats	Luxury/upper upscale	Heteroskedasticity-robust *t*-stats	Upscale	Heteroskedasticity-robust *t*-stats	Midscale	Heteroskedasticity-robust *t*-stats	Extended stay	Heteroskedasticity-robust *t*-stats
Panel A: NOIPAR										
Constant	−0.007	−1.57	−0.015	−1.57	0.007	1.00	−0.018	−2.02**	0.001	0.25
Occupancy (%Δ)	1.834	26.21***	1.817	8.43***	2.013	13.69***	1.675	14.88***	1.926	27.88***
ADR (%Δ)	1.902	41.13***	1.979	18.39***	1.610	17.80***	2.038	21.26***	1.933	31.85***
N	2,142		666		513		462		501	
F value	1591***		355***		303***		668***		891***	
R^2	0.728		0.647		0.733		0.751		0.847	
Panel B: GOPPAR										
Constant	−0.001	−0.12	−0.002	−0.50	0.011	2.33**	−0.009	−1.74*	0.001	0.17
Occupancy (%Δ)	1.591	46.20***	1.705	18.69***	1.710	23.16***	1.48	21.37***	1.553	35.93***
ADR (%Δ)	1.561	60.41***	1.550	25.45***	1.434	28.88***	1.595	29.14***	1.612	41.75***
N	2,142		666		513		462		501	
F value	4646***		936***		1422***		1435***		1442***	
R^2	0.851		0.801		0.874		0.867		0.895	

Notes: * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$; Panel A dependent variable in multiple regression = Percentage change in NOIPAR. Panel B dependent variable = Percentage change in GOPPAR. NOIPAR and GOPPAR are winsorized at the top and bottom 1 per cent; Midscale segment includes hotels with and without F&B

Table 6. Flow-through ratios (by chainscale).

	All hotels	Heteroskedasticity-robust *t*-stats	Luxury/upper upscale	Heteroskedasticity-robust *t*-stats	Upscale	Heteroskedasticity-robust *t*-stats	Midscale	Heteroskedasticity-robust *t*-stats	Extended stay	Heteroskedasticity-robust *t*-stats
Panel A: NOIPAR										
Constant	−0.010	−2.33**	−0.019	−1.82*	−0.003	−0.48	−0.0112	−1.49	−0.003	−0.59
RevPAR (%Δ)	1.878	42.91***	1.894	15.12***	1.826	24.92***	1.912	38.47***	1.897	42.94***
N	2142		666		513		462		501	
F value	1841***		229***		621***		1480***		1844***	
R^2	0.730		0.620		0.751		0.762		0.855	
Panel B: GOPPAR										
Constant	−0.004	−1.60	−0.006	−1.29	0.002	0.46	−0.007	−1.62	−0.003	−0.84
RevPAR (%Δ)	1.591	90.25***	1.647	41.31***	1.576	44.76***	1.578	54.67***	1.553	51.31***
N	2142		666		513		462		501	
F value	8146		1706***		2003***		2989		2633***	
R^2	0.902		0.813		0.884		0.878		0.900	

Notes: * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$; Panel A dependent variable = Percentage change in NOIPAR; Panel B dependent variable = Percentage change in GOPPAR; Midscale segment includes hotels with and without F&B