The effects of the minimum wage on the operating performance of hotels in the U.S.

Abstract

The economic effects of the minimum wage have been the focus of ongoing contradictory debates among policymakers and researchers. This study finds a positive effect of the minimum wage on the operating profitability of hotels in the U.S. However, the pricing practices of full-service hotels are dissimilar to those of limited-service hotels. Although the burden of the minimum wage is substantial, full-service hotels can spread the weight onto other departments, while limited-service hotels mainly rely on rooms revenue. Thus, the effects of the minimum wage on room price (average daily rate; ADR) are more substantial at limited-service hotels than at full-service hotels even though operating profitability (gross operating profit per available room; GOPPAR) is not substantially different between them. Eventually, increased minimum wage can play a beneficial role not only for the hotel industry but also for local society, since minimum wage employees take home a larger salary.

Keywords: minimum wage; ADR; GOPPAR; full-service hotels; limited-service hotels

1. Introduction

Despite the unquestionable purpose of the minimum wage to protect employees against unduly low pay, the contradictory debates on its economic effects are ongoing among policymakers and researchers. The opponents argue that high minimum wage causes a financial burden for employers, which forces them to significantly decrease the number of jobs available for low-skilled employees and ultimately leads to low employment (e.g., Brown, 1999; Neumark & Nizalova, 2007; Neumark & Wascher, 2007). On the other hand, the supporters of minimum

wage contend that there is no such substantial negative impact of high minimum wage on employment because higher wages result in low-paid employees having higher motivation in their jobs, which sometimes even leads to positive economic effects (e.g., Card & Krueger, 1995; Dickens, Machin, & Manning, 1999; Dube, Lester, & Reich, 2010; Jardim, Long, Plotnick, Van Inwegen, Vigdor, & Wething, 2017; Metcalf, 2008). However, it is important to note that no study directly examines the impact of the minimum wage on the business aspects of employers (i.e., financial burdens or operating performance) even though they lead different business decisions in response to the increase in the minimum wage (i.e., lay-off employees or cut back on hiring).

The hospitality industry plays an essential role in clarifying and justifying the arguments. This is because the hospitality industry, including restaurants and hotels, is a labor-intensive industry and hires a relatively larger proportion of low-wage employees than other industries (e.g., Adam-Smith, Norris, & Williams, 2003; Aaronson, French, & MacDonald, 2008; Kim & Jang, 2020; MaCurdy, 2015). Consequently, the impact of the minimum wage on the economic conditions of the hospitality industry is likely to be more substantial than on those of other industries whose businesses rely less on minimum wage workers (Aronson et al., 2008; MaCurdy, 2015). To understand the effect of the minimum wage on hotel performance, this study specifically focuses on hotels at the property level and explores several possible ways that hotels may sustain high labor costs prompted by increased minimum wage. The first possibility is that a hotel can shift the extra costs to customers (both domestic and international tourists) by increasing the price of their products and/or services. The other option is that a hotel can absorb the increased expenses within the company by sacrificing the margins and enduring lower

profits. Otherwise, the company would need to reduce labor costs and try to improve efficiency by laying off low-skilled employees or eliminating managerial slack.

In the U.S., each state has a different level of minimum wage requirements. For example, the minimum wage in California, New York, Florida, Texas, and Illinois was different in 2019 ($12, $11.10, $8.46, $7.25, and $8.25 per hour, respectively) although the federal minimum wage was $7.25 in 2019. In addition, the state minimum wage has been changed at a different rate among different states over the years. However, following Card and Krueger (1994), the majority of recent studies, used a difference-in-differences method (Callaway & Sant'Anna, 2018; Dube, 2019; Meer & West, 2016) and focused on the differences in greatly aggregated outcomes (i.e., employment or wages) between a control group (firms or people that are less likely to be influenced by the minimum wage) and a treated group (firms or people that are more likely to be influenced by the minimum wage) in a few specific years when they showed large jumps in minimum wage (Aaronson, French, Sorkin, & To, 2018; Cuong, 2017; Draca, Machin, & Van Reenen, 2011; Harasztosi & Lindner, 2019; Metcalf, 2008).

This quasi-experimental approach would be appropriate for determining whether increased minimum wage reduces employment if there are only one or two big policy changes in the level of minimum wage over the years (i.e., pre-treated periods vs. post-treated periods). In addition, the model would be effective only if the changes in minimum wage do not influence employment of the control group but significantly influence employment of the treated group (i.e., the two groups would follow parallel trends in the absence of treatment). Besides, to make the difference-in-differences model valid, the effects of the unmeasured determinants on employment must be the same for the control and treated groups over the years (i.e., group and time invariants; e.g., Lechner, 2011; Wing, Simon, & Bello-Gomez, 2018). In these contexts, the

difference-in-differences approaches may not be suitable for measuring the economic effects of a minimum wage when it has been increasing continuously at different rates over a few consecutive years (i.e., FL, CA, and NY); specifically, it is difficult to decompose post-treatment effects. Importantly, the difference-in-differences models are used not to measure the direct impact of the minimum wage on the business performance of an individual firm but more frequently to compare the aggregated consequences (i.e., state's employment census data) of policy interventions between two groups (i.e., states, counties, or industries).

Due to these methodological limitations and dissimilarities, this study applied the generalized estimating equation (GEE) and two-way random-effects regression (RE) models to measure the effects of the minimum wage on the business performance of hotel firms over the recent five years. To the best of our knowledge, no study has examined the effects of minimum wage on property-level hotel firm performance even though the proportion of minimum wage employees is substantially large compared to that of other industries (e.g., Metcalf, 2008). In this study, we emphasize the relationship between the changes in minimum wage and the operating performance of full-service and limited-service hotels in the U.S. More specifically, we intend to demonstrate whether increased minimum wage pushes up hotel room prices and/or decreases profitability of the hotels. Furthermore, we aim to show whether the changes in minimum wage have a negative or positive impact on the operational performance of the hotels. We expect that the impact of the minimum wage should be different between full-service and limited-service hotels in the aspects of salary expenses, room prices, and operating profitability. Furthermore, in this study, we suggest a heterogeneity of responses to the minimum wage based on hotels' different service levels. The findings will broaden the knowledge about the relationship between the minimum wage and hotels' operational performance from hotel management's viewpoint.

2. Literature Review

The minimum wage has been discussed for several decades, especially its effect on employment (Aaronson et al., 2008; Jardim et al., 2017; Lynn & Boone, 2015; Reich et al., 2016; Repetti & Roe, 2018), output prices (Allegretto & Reich, 2018; Harasztosi & Lindner, 2019; MaCurdy, 2015), and firm profitability (Draca, Machin, & Van Reenen, 2011; Kim & Jang, 2019; Riley & Rosazza Bondibene, 2017). Although their findings and evidence are still controversial, there is a general consensus that minimum wage effects can be significantly different across industries, firms, cities, or labor markets (Draca et al., 2011; Harasztosi & Lindner, 2019). From these perspectives, it is critical to test the effect of the minimum wage considering the specific nature of hotels. The hospitality industry makes heavy use of minimum wage workers (Jardim et al., 2017; Kim & Jang, 2019; Reich et al., 2016; Repetti & Roe, 2018; Sherk, 2017) and also has services with unique characteristics, such as heterogeneity and perishability, which lead to different patterns of minimum wage effects.

There are a few studies that look into the minimum wage in the hospitality industry, but the findings mainly rely on the opinions of either employees (Joo-Ee, 2016) or managers (Brown & Crossman, 2000) and are thus limited when directly answering the effect of the minimum wage on hotels' operational practices and performance. Besides, most hospitality industry minimum wage studies were undertaken in the context of the restaurant industry (Aaronson et al., 2008; Allegretto & Reich, 2018; Kim & Jang, 2019; Lynn & Boone, 2015; Repetti & Roe, 2018) which has a different wage system from hotels: the tip credit system. Restaurants are allowed to pay employees lower than minimum wage (e.g., $2.13 per hour in 2019) as they

receive at least $30 per month in tips. The restaurant industry, especially full-service restaurants, rely substantially on these tipped minimum wage workers (Aaronson et al., 2008; Kim & Jang, 2019), but hotels rely less on the tipping system and thus have more workers who are paid at regular minimum wage levels (Keller & Kelley, 2015).

2.1. Minimum Wages in the Hotel Industry

Hotels have inherent limitations when operating their rooms and services; they produce the same number of rooms every day (i.e., perishability), and their quality may vary because service is delivered by employees who are individually different (i.e., heterogeneity). These inevitable limitations have led hotels to make great efforts to maintain consistent service quality and efficient human resources management (Chacko, Davidson, & Green, 2006). Thus, hotels would not to reduce their employment substantially even if the minimum wage rose considerably. Given the fact that labor costs account for most of the hotel's operating expenses (Keller & Kelley, 2015; Mandelbaum, 2017), the minimum wage could significantly impact overall payroll expenses for hotels (Allegretto & Nadler, 2015).

However, full-service and limited-service hotels have different strategic orientations (Canina, Enz, & Harrison, 2005). The competitive advantage of limited-service hotels emerges from low prices with consistent service quality (Baum & Haveman, 1997; Hoque, 2000), but that of full-service hotels comes from a variety of high quality services (Canina et al., 2005; Mun, Woo, & Paek, 2019). This difference could lead to different reactions from full-service and limited-service hotels when the minimum wage increases. To maintain their competitive advantage (i.e., lower price), some limited-service hotels would choose cost-saving measures, such as employing more part-timers and younger staff, stopping overtime, and introducing

unpaid breaks (Brown & Crossman, 2000; Mandelbaum, 2017). These measures are more suitable for limited-service hotels rather than full-service hotels because they offer limited and basic services (Ren, Qiu, Wang, & Lin, 2016) that can be delivered by lower skilled or less trained employees (Brown & Crossman, 2000).

However, the cost minimization strategy of reducing labor cost would be harder to implement in full-service hotels as their primary competitive advantage comes from service quality (Chathoth & Olsen, 2003; Lai & Hitchcock, 2017; Sun, Aryee, & Law, 2007). Rather than reducing labor costs, full-service hotels would rather pursue quality maximization, such as by employing better quality or older staff (Brown & Crossman, 2000). Customers of full-service hotels are less sensitive to price but more influenced by the service quality and comfortable environment, such as a wide range of facilities and attentive staff (Lai & Hitchcock, 2017; Peng & Chen, 2019). To provide exceptional service, full-service hotels need "greater staff/customer ratios, more service offerings, and a wider range of interactions (Chathoth, 2007, p. 396)" than limited-service hotels. Thus, developing and retaining high quality employees is crucial for full-service hotels (Lai & Hitchcock, 2017) because their rich experiential knowledge related to customers is not easily replaceable (Sun et al., 2007). This implies that it is harder for full-service hotels to mitigate their increased payroll expenses than it is for limited-service hotels.

Moreover, full-service hotels require a variety of job positions for each department. This difference between full-service and limited-service hotels can also affect total salary expenses differently when minimum wage increases. The number of employees in full-service hotels is relatively larger than in limited-service hotels due to larger firm size and diverse range of services, such as food and beverage, spa, and banquet services. As front line employees receive the minimum wage in most departments (AH&LA, 2014; Mandelbaum, 2017), the minimum

wage would affect most departments in full-service hotels (Keller & Kelley, 2015). Consequently, because of this ripple effect, an increased minimum wage would have a larger effect on average wages in full-service hotels than in limited-service hotels (Allegretto & Reich, 2018; Dube, Naidu, & Reich, 2007; Reich et al., 2016). If full-service hotels have to raise their wages for employees who receive the minimum wage, they need to raise the wages for the other employees who work longer and those who hold higher positions than minimum wage employees (i.e., non-minimum wage workers). Besides, according to Wage Watch (2019), full-service hotels paid higher salaries than limited-service hotels for the same job positions to attract and keep better employees (e.g., front desk agent $14.55 at full-service hotels vs. $11.96 at limited-service hotels; and housekeeper $13.81 vs. $11.32): full-service hotels had a wider and more flexible salary structure (Kline & Hsieh, 2007). Therefore, the effects of the minimum wage may have a greater effect on salary expenses of full-service hotels than those of limited-service hotels; we therefore make the following hypotheses:

H1-1. The minimum wage has a significant positive impact on salary expenses (the relationship between salary expense over total revenue and revenue per available room (RevPAR)) in hotels.

H1-2. The minimum wage has a more significant impact on salary expenses (the relationship between salary expense over total revenue and RevPAR) in full-service hotels than in limited-service hotels.

2.2. The Impact of Minimum Wage on ADR

Hotel room supply is relatively fixed and cannot respond promptly to a change in demand (i.e., inelastic supply), so changes in room price or Average Daily Rate (ADR) are frequent and common. Unlike other industries, hotels cannot promptly increase their supply (i.e., the number of rooms and other services), and it is hard to reduce the number of employees due to the inseparability and heterogeneity of service quality (i.e., a service is inseparable from the person providing it, and thus, the knowledge or skills of employees signify the service quality). Instead, hotels adjust prices to cope with rising labor costs due to increased minimum wage. In addition to the general features of the hotel industry, there are several considerations that need to be made when exploring the impact of the minimum wage on room prices. Depending on the labor markets and revenue resources that hotels rely on, the effect size of the minimum wage may vary (Aaronson et al., 2008). It is suggested that hotels can react differently toward increased salary expenses; all increased labor costs can be passed on to consumers (MaCurdy, 2015), or hotels can share some of the expenses (Harasztosi & Lindner, 2019).

It is important to understand labor market differences (competition vs. monopsony) between full-service hotels and limited-service hotels because the percentage of minimum wage workers varies across levels of hotel services. Mostly, the minimum wage is applies for low-skilled and less-productive workers (Harasztosi & Lindner, 2019; Reich et al., 2016), such as housekeepers, laundry attendants, and front desk agents in the rooms department (AH&LA, 2014; Keller & Kelley, 2015). Given that limited-service hotels mainly provide basic accommodation services (e.g., rooms or rooms with simple breakfast; Ren et al., 2016; Xu & Li, 2016), limited-service hotels easily find and substitute low-skilled workers in the labor market (Aaronson et al., 2008; Lynn & Boone, 2015; Repetti & Roe, 2018). Under this monopsony labor market, firms either decrease their employment rate (Aaronson et al., 2008; Wessels, 1997) if the

costs of hiring a new employee are lower than the minimum wage increases, or increase the price of their products and/or services if the replacement costs for an existing employee are still higher than the minimum wage increases (Aaronson et al., 2008; Dube, Lester, & Reich, 2016; Harasztosi & Lindner, 2019; Repetti & Roe, 2018; Sherk, 2017) when they face a rise in the minimum wage. However, as limited-service hotels also need to sustain an appropriate level of service quality, they would rather increase their room prices than reduce the number of employees because of the inseparability of service quality (Bebko, 2000; Draca et al., 2011; Dube, 2019; Haynes & Fryer, 2000; Kline & Hsieh, 2007). An increased minimum wage also raises sunk costs for hiring a new employee but lowers the value of laying-off a current employee (Dube et al., 2016).

Compared to limited-service hotels, full-service hotels require more highly skilled workers with rich knowledge and extensive experience to provide multifaceted services (Kim & Jang, 2019; Sun et al., 2007). These highly skilled workers are competitive in the labor market so they are usually paid more than minimum wage; the labor market for full-service hotels is closer to the competitive market. Under the competitive labor market, firms tend to reduce employment when they face an increase in minimum wage because they can increase labor efficiency and productivity with less employees (Aaronson et al., 2008; Ahmad, Scott, & Abdul-Rahman, 2016; Harasztosi & Lindner, 2019; Kim & Jang, 2019; Lynn & Boone, 2015; Riley & Rosazza Bondibene, 2017). For example, it is common in full-service hotels that some employees are multi-skilled (Brown & Crossman, 2000) so even though they are assigned to one department (e.g., sales and marketing), they can work in other departments (e.g., restaurant) for their colleagues when hotels are in need (e.g., night shifts or day-off). Thus, full-service hotels would not directly increase their room price as a response to a minimum wage hike.

More importantly, the revenues from the different departments of full-service hotels allow them to spread the risk from minimum wage increases. As suggested by Lee and Jang (2007), diversified strategies of hotel companies minimized risks and improved stability in financial performance. In this regard, full-service hotels can be considered as pursuing a diversification strategy (Chen & Chang, 2012; Yeh, Chen, & Hu, 2012) by providing various services through "a wide variety of onsite amenities, such as restaurants, meeting spaces, exercise rooms or spa" (STR, 2020). For instance, some hotels generate more revenue and profits from food and beverage, which has been treated as supplementary to the rooms (Chen & Chang, 2012; Yeh et al., 2012). From this perspective, full-service hotels can absorb the shock of a minimum wage increase by spreading out the expenses over different departments. This is also in line with the price pass-through of limited-service hotels; they can only create revenues from the rooms department, so they necessarily have to raise room prices to cover their increase in labor costs. Based on the argument above, the following hypotheses were developed:

H2-1. The minimum wage has a significant positive impact on room price (ADR) (the relationship between occupancy rate and RevPAR) in hotels.

H2-2. The minimum wage has a more significant impact on room price (ADR) (the relationship between occupancy rate and RevPAR) in limited-service hotels than in full-service hotels.

2.3. The Impact of Minimum Wage on Hotel Profits

Due to the perishability of hotels, room supply is relatively inelastic, but demand is closer to elasticity. This indicates that hotels can change their room prices easily (Keller & Kelley,

2015), but at the same time, hotels need to consider competitors' prices. If limited-service hotels raised room prices because of increased minimum wage, the increased room price would result in a competitive disadvantage compared to competitors who maintain room prices (Sherk, 2017). In this case, the occupancy rate of limited-service hotels would decrease and offset the increased profits from increased price.

However, the price elasticity of demand in limited-service hotels is sensitive, in that customers of limited-service hotels are more sensitive to increased room prices (Sherk, 2017). If limited-service hotels concerned about these customers, then they would decide to cover the costs of the minimum wage by bearing increased salary expenses. In this case, the occupancy rate would increase because they offer relatively lower room prices than do other hotels, which increased prices because of increased minimum wage. As a result, their lowered profits by maintain prices would be compensated for by the increased demand. Therefore, in both cases, the hotels' operating profits would not be significantly different from those before the minimum wage hike because increased room price or revenue would offset the increased salary expenses.

As suggested before, customers of full-service hotels are less sensitive to room prices. Higher prices would not drive customers away, so full-service hotels can raise prices (albeit a smaller price increase compared to limited-service hotels), which could compensate for increased labor costs. Although total salary expenses can significantly increase due to the minimum wage, full-service hotels can absorb the effects of the minimum wage though increased revenue from other departments. Unless service quality is dropped significantly, the occupancy rate and revenue from other departments will remain similar in full-service hotels. Consequently, a surge in the minimum wage would likewise not cause significant deterioration in full-service hotels' operating profitability.

Nevertheless, a minimum wage increase imposes changes in costs and prices differently on full-service and limited-service hotels (Repetti & Roe, 2018), but its effect on operating profit responses would be similar in both types of hotel (Lynn & Boone, 2015). The lack of differences in operating profits may be derived from hotels' demand elasticity; demand elasticity of limited-service hotels is larger than that of full-service hotels. In addition, both hotels are actively implementing systematic revenue management practices based on their daily customer demands to maintain persistent operating performance. Therefore, even though previous literature presented mixed results – either negative (Draca et al., 2011) or positive (Harasztosi & Lindner, 2019; Kim & Jang, 2019) effects of minimum wage on operating profits – we make the following hypotheses:

H3-1. The minimum wage does not have a significant impact on gross profit (GOPPAR) in hotels.

H3-2. The impact of the minimum wage on gross profit (GOPPAR) would not be significantly different for full-service hotels and limited-service hotels.

3. Methodology

3.1. Samples and Data

This study used the value of the minimum wage in five states of the United States, namely: California (1), Florida (2), Illinois (3), New York (4), and Texas (5), as an important independent variable. According to the U.S. National Travel and Tourism Office, these states

were among the most popular ports of tourist arrivals during the study years (I-94 Arrivals: Monthly-Quarterly-Annual: National Travel and Tourism Office). Together with the minimum wage data, three types of operational performance data of hotels in those five states were used as dependent variables to measure the effects of the minimum wage on hotels. The minimum wage data, state revenue, and state monthly employment data were collected from the U.S. Bureau of Labor Statistics website, while hotel performance data was collected from STR reports. The number of hotels was 1,068 with 10,664 observations from 2013 to 2017, which represented slightly unbalanced panel data: about 330 hotels with 3,300 observations in California, 230 hotels with 2,380 observations in Florida, 130 hotels with 1,280 observations in Illinois, 60 hotels with 590 observations in New York, and hotels 318 with 3,114 observations in Texas. The sample included more limited-service hotels (about 630 hotels with 6,278 observations) than full-service hotels (about 438 hotels with 4,386 observations): a few hotels changed to full-service hotels from limited-service hotels or vice versa over the years.

3.2. Variables

In this study we examined the effects of the minimum wage [LogMW] on three important operating performance measures of hotels; these were 1) salary expense (natural log of total salary expense over total revenue after controlling for natural log of revenue per available room [LogRevPAR] constant), 2) ADR (natural log of revenue per available room [LogRevPAR] after controlling for natural log of occupancy [LogOccupancy]), and 3) gross operating profit per available room [LogGOPPAR = log (total revenue – total expense / the number of total available rooms) without controlling for ADR, occupancy rate, or RevPAR]. To test the effect of the minimum wage on ADR, the models used RevPAR after controlling the occupancy rate to avoid

potential issues of reverse causality or simultaneous problems. For example, ADR (dependent variable) could influence the occupancy rate (independent variable) but RevPAR (dependent variable) might not influence the occupancy rate (independent variable). All four logarized dependent variables showed fairly normal distributions, which were otherwise highly skewed (Benoit, 2011; Keene, 1995). To test the effect of the minimum wage, the first model controlled for RevPAR and examined its [LogMW] impact on salary expense [Log(Total salary expense/total revenue)] and the second model controlled for the occupancy rate and examined its [LogMW] impact on RevPAR [LogRevPAR]. Thus, the first model showed the effect of the minimum wage on salary expense because the revenue was constant and the second model represented the effect of the minimum wage on ADR because the occupancy rate held constant.

In each model, an interaction term [mean centered LogRevPAR * mean centered LogMW or mean centered LogOccupancy * mean centered LogMW] was added to confirm the effects of the minimum wage on salary expense [mean centered LogRevPAR * mean centered LogMW] and rooms price [mean centered LogOccupancy * mean centered LogMW]. The minimum wage was neither a continuous variable nor a categorical variable (ranging between $6.55 and $10.50), and thus had a limitation when being considered as a robust independent variable. To overcome the limitations, in this study we used an interaction term instead and measured the effects of the minimum wage on salary expense and ADR indirectly because the relationship between the ratio of total salary expense over total revenue and RevPAR (i.e., negative relationship) and between RevPAR and the occupancy rate (i.e., positive relationship) were very robust. In addition, when a model included an interaction term, this study used the mean centered value for the related independent variables [mean centered LogRevPAR, LogOccupancy, and LogMW] and the variables in the interaction term [mean centered

LogRevPAR * mean centered LogMW or mean centered LogOccupancy * mean centered LogMW] to avoid the issue of multicollinearity (Afshartous & Preston, 2011; Enders & Tofighi, 2007; Iacobucci et al., 2016; Robinson & Schumacker, 2009). Besides, an interaction term of minimum wage and hotel type [mean centered LogMW * Full] was included in each model to examine the distinctive effects of minimum wage on firm performance [salary expense, ADR, and GOPPAR] between full-serve and limited-service hotels.

For other control variables, the class of hotels [luxury (1), upper-upscale (2), upscale (3), upper-midscale (4), midscale (5), and economy (6)], location [urban (1), suburban (2), airport (3), interstate/motorway (4), resort (5), and small metro/town (6)], years of operation, and the size of hotel [less than 75 rooms (1), 75-149 rooms (2), 150-299 rooms (3), 300-500 rooms (4), and greater than 500 rooms (5)] were included in all models and the classifications were based on the definitions of STR reports. Besides, the state's total revenue [natural log of state GDP], and state monthly employment [natural log of the average monthly state employment] were also included in all models as control variables. The correlation between state and state's total revenue or state monthly employment was high and thus, to avoid the issue of multicollinearity, the models did not include the state dummy variable to control state-specific effects. However, the year dummy was included to control time-specific effects.

3.3. Models

This study compares the ordinary least square models (OLS), generalized estimating equations regression models (GEE), and two-way random-effects regression models (RE). The benefit of using GEE models is that the estimates of GEE models are unbiased and consistent even if the models are unspecified (Ballinger, 2004; Liang & Zeger, 1986; Zeger & Liang,

1986). The GEE models are especially efficient for longitudinal panel data with non-normal response variables. On the other hand, the two-way random-effects regression models use the generalized least squares method, which provides the unbiased estimator of β when the OLS estimator is not the best linear unbiased estimator due to heteroscedasticity issues (i.e., different variances in errors and correlation among errors; Greene, 2008). To achieve more vigorous inferences, we compared the results of three different models (OLS, GEE, and RE) with three different dependent variables (salary expense, ADR, and GOPPAR). In model 3, we did not control hotels' RevPAR, occupancy, or ADR to measure the effects of the minimum wage on GOPPAR. This is because, in reality, the minimum wage increases ADR but the increased ADR decreases the occupancy rate (e.g., Aaronson 2001; Aaronson et al., 2008; Allegretto & Reich, 2018; Dube, 2019; MaCurdy, 2015).

In this study we used two-way random-effects models instead of fixed-effects regression models because fixed-effects regression models cannot include time invariant variables, including class, location, and size of a hotel (Baltagi, 2008; Gardiner, Luo, & Roman, 2009, p.235; Greene, 2008; Plümper & Troeger, 2007; Torres-Reyna, 2007; Woodridge, 2002). Also, the dummy variable for full-service hotels (1 for full-service hotels and 0 for limited-service hotels) is a time invariant variable but an important variable to test the moderating effects of hotel type (full-service vs. limited-service) on the relationship between the minimum wage on firm performance (salary expense, ADR, and GOPPAR). According to Bell and Jones (2015), RE models are more flexible and generalizable in addition to being capable of including time-invariant variables when the models are correctly specified. Therefore, for the present study, RE models are more appropriate than FE models (Bell & Jones, 2015). The GEE and RE are popular statistical models for analyzing longitudinal repeated-measures data to address the correlation

between data (Ballinger, 2004; Gardiner et al., 2009; Hubbard et al., 2010). In addition, the two models are complementary because the GEE estimator is efficient and robust even if the true variance is misspecified, while the RE model assumes an unobserved variance is random and uncorrelated with independent variables (Ballinger, 2004; Bell, Fairbrother, & Jones, 2019; Gardiner et al., 2009; Greene, 2008; Hanley et al., 2003; Hubbard et al., 2010). The models are expressed as follows:

1) Salary expense (The dependent variable (Y_{it}) is a natural log of total salary expense over total revenue)

$$Y_{it} = \beta_0 + \beta_1 * \text{LogRevPAR}_{it} + \beta_2 * \text{LogMW}_{it} + \beta_3 * \text{Class}_{it} + \beta_4 * \text{Location}_{it} + \beta_5 * \text{Year of operation}_{it} + \beta_6 * \text{Size}_{it} + \beta_7 * \text{Log(state total revenue)}_{it} + \beta_8 * \text{Log(state monthly employment)}_{it} + \beta_9 * \text{Year dummy}_t + \gamma_{it} + \varepsilon_{it}$$

1-1) Effect of the minimum wage

$$Y_{it} = \beta_0 + \beta_1 * \text{mean centered LogRevPAR}_{it} + \beta_2 * (\text{mean centered LogRevPAR}_{it} * \text{mean centered LogMW}_{it}) + \beta_3 * \text{mean centered LogMW}_{it} + \beta_4 * \text{Class}_{it} + \beta_5 * \text{Location}_{it} + \beta_6 * \text{Year of operation}_{it} + \beta_7 * \text{Size}_{it} + \beta_8 * \text{Log(state total revenue)}_{it} + \beta_9 * \text{Log(state monthly employment)}_{it} + \beta_{10} * \text{Year dummy}_t + \gamma_{it} + \varepsilon_{it}$$

1-2) Moderating effect of full-service hotels

$$Y_{it} = \beta_0 + \beta_1 * \text{LogRevPAR}_{it} + \beta_2 * \text{mean centered LogMW}_{it} + \beta_3 * (\text{mean centered LogMW}_{it} * \text{Full}_{it}) + \beta_4 * \text{Full}_{it} + \beta_5 * \text{Class}_{it} + \beta_6 * \text{Location}_{it} + \beta_7 * \text{Year of operation}_{it} + \beta_8 * \text{Size}_{it} + \beta_9 * \text{Log(state total revenue)}_{it} + \beta_{10} * \text{Log(state monthly employment)}_{it} + \beta_{11} * \text{Year dummy}_t + \gamma_{it} + \varepsilon_{it}$$

2) ADR (The dependent variable (Y_{it}) is a natural log of RevPAR with a natural log of the occupancy rate as a control variable)

$$Y_{it} = \beta_0 + \beta_1 * \text{LogOccupancy}_{it} + \beta_2 * \text{LogMW}_{it} + \beta_3 * \text{Class}_{it} + \beta_4 * \text{Location}_{it} + \beta_5 * \text{Year of operation}_{it} + \beta_6 * \text{Size}_{it} + \beta_7 * \text{Log(state total revenue)}_{it} + \beta_8 * \text{Log(state monthly employment)}_{it} + \beta_9 * \text{Year dummy}_t + \gamma_{it} + \varepsilon_{it}$$

2-1) Effect of the minimum wage

$Y_{it} = \beta_0 + \beta_1 *$ mean centered $LogOccupancy_{it} + \beta_2 *$ (mean centered $LogOccupancy_{it} *$ mean centered $LogMW_{it}) + \beta_3 *$ mean centered $LogMW_{it} + \beta_4 * Class_{it} + \beta_5 * Location_{it} + \beta_6 *$ Year of $operation_{it} + \beta_7 * Size_{it} + \beta_8 *$ Log(state total $revenue)_{it} + \beta_9 *$ Log(state monthly $employment)_{it}$ $+ \beta_{10} *$ Year $dummy_t + \gamma_{it} + \varepsilon_{it}$

2-2) Moderating effect of full-service hotels

$Y_{it} = \beta_0 + \beta_1 * LogOccupancy_{it} + \beta_2 *$ mean centered $LogMW_{it} + \beta_3 *$ (mean centered $LogMW_{it} * Full_{it}) + \beta_4 * Full_{it} + \beta_5 * Class_{it} + \beta_6 * Location_{it} + \beta_7 *$ Year of $operation_{it} + \beta_8 * Size_{it} + \beta_9 *$ Log(state total $revenue)_{it} + \beta_{10} *$ Log(state monthly $employment)_{it} + \beta_{11} *$ Year $dummy_t + \gamma_{it}$ $+ \varepsilon_{it}$

3) GOPPAR (The dependent variable (Y_{it}) is a natural log of GOPPAR)

3-1) Effect of the minimum wage

$Y_{it} = \beta_0 + \beta_1 * LogMW_{it} + \beta_2 * Class_{it} + \beta_3 * Location_{it} + \beta_4 *$ Year of $operation_{it} + \beta_5 * Size_{it} + \beta_6 *$ Log(state total $revenue)_{it} + \beta_7 *$ Log(state monthly $employment)_{it} + \beta_8 *$ Year $dummy_t + \gamma_{it}$ $+ \varepsilon_{it}$

3-2) Moderating effect of full-service hotels

$Y_{it} = \beta_0 + \beta_1 *$ mean centered $LogMW_{it} + \beta_2 *$ (mean centered $LogMW_{it} * Full_{it}) + \beta_3 * Full_{it} + \beta_4 * Class_{it} + \beta_5 * Location_{it} + \beta_6 *$ Year of $operation_{it} + \beta_7 * Size_{it} + \beta_8 *$ Log(state total $revenue)_{it} + \beta_9 *$ Log(state monthly $employment)_{it} + \beta_{10} *$ Year $dummy_t + \gamma_{it} + \varepsilon_{it}$

4. Results

4.1. Descriptive Operating Information

The figures in column 3 and 4 of Table 1 indicate that the overall operating performance of hotels was higher during the periods when minimum wage changed compared to its counterpart, including RevPAR ($98.46 vs. $87.61), occupancy rate (73.77% vs. 72.73%), ADR ($131.08 vs. $119.20), and GOPPAR ($51.78 vs. $45.00). In addition, salary expense per available rooms ($39.41 vs. $35.11) was higher in hotels during the periods when minimum wage changed, although the proportion of salary expense was similar (26.10% vs. 26.72%) due

to the effect of higher revenue. Hotel size (239 rooms vs. 235 rooms) was similar but there were fewer hotels (4,513 vs. 6,151 observations) during the periods minimum wage changed compared to when it remained unchanged.

As expected, RevPAR ($132.24 vs. $64.24), ADR ($178.67 vs. $86.19), and GOPPAR ($67.55 vs. $34.12) were higher in full-service hotels than in limited-service hotels even though the occupancy rate (73.12% vs. 73.21%) is similar in column 5 and 6. Both the salary expense per available room ($70.37 vs. $13.57) and the proportion of salary expense (34.07% vs. 21.14%) were much higher in full-service hotels than in limited-service hotels. Not surprisingly, the hotel size (399 rooms vs. 123 rooms) was much larger in full-service hotels than in limited-service hotels.

(Insert Table 1)

Figure 1 also displays a substantial difference in the changes in salary expense and ADR over the years between hotels during the periods when the minimum wage changed and those when it remained unchanged. However, such a significant difference was not observed between full-service and limited-service hotels: there was no huge difference in the changes of salary expense and ADR over the years (slope) but only a large gap in the average amount of salary expense and ADR (intercept).

(Insert Figure 1)

The minimum wage increased at different rates among states from 2008 to 2017 as shown in Figure 2 (CA: 31.1% and $2.50 from $8 to $10.5, FL: 19.3% and $1.31 from $6.79 to $8.10, IL: 6.5% and $0.50 from $7.75 to $8.25, NY: 35.7% and $2.55 from $7.15 to $9.70, and TX 10.7% and $0.70 from $6.55 to $7.25). The figure indicates that the states that had the largest or

lowest changes in the minimum wage did not necessarily have the highest or lowest minimum wage. Thus, either the amount of change or the ratio of change of the minimum wage may not accurately reflect the burdens of the minimum wage for hotels, although they were the main independent variables in most previous studies that used a difference-in-differences model (e.g., Neumark & Wascher, 2007; Dube et al., 2010; Jardim et al., 2017). For example, a hotel in IL had $1 higher minimum wage than a hotel in TX in 2017 although the amount change ($0.50 vs. $0.70, respectively) and the change in ratio (6.5% vs. 10.7%, respectively) from 2008 to 2017 were lower and thus, an additional $1 increase would be a heavier burden for hotels in IL than for those in TX.

(Insert Figure 2)

4.2. Regression Analysis

Effect of the minimum wage on salary expense

The proportion of total salary expense in total revenue (a dependent variable) in the regression models actually represented the changes in salary expense because the models controlled the RevPAR (an independent variable) constant. Consequently, the coefficient of LogMW (natural log of the minimum wage) should be positive because it indicated the relationship between the minimum wage and salary expense when revenue did not change: as the minimum wage increased, salary expense increased. Similarly, the coefficient of LogRevPAR (natural log of RevPAR) should be negative since the increased RevPAR would lower the ratio of salary expense over total revenue when the minimum wage did not change. Consistent with our expectation, the coefficient of LogRevPAR was significantly negative in all models (-0.1753, $p < 0.01$ in OSL; -0.6955, $p < 0.01$ in GEE; -0.5130, $p < 0.01$ in RE). However, unexpectedly, the coefficient of LogMW was not statistically significant in both GEE and RE models (0.0283,

494 $p > 0.1$ in GEE and -0.0595, $p > 0.1$ in RE). The finding indicated that the minimum wage
495 increase might not substantially increase the overall salary expense ratio of hotels in a simple
496 model, probably, due to its small proportion.

497 Nevertheless, the interaction term of RevPAR and the minimum wage
498 [LogRevPAR*LogMW] was statistically positively significant for all three models (0.4752,
499 $p < 0.01$ in OSL; 0.2912, $p < 0.01$ in GEE; 0.3418, $p < 0.01$ in RE). The results were robust
500 among models and confirmed the positive effect of the minimum wage on salary expense, which
501 supported hypothesis 1-1. In other words, the finding specified that as the minimum wage
502 increased by 1%, it increased the ratio of salary expense over total revenue by 0.2912% based on
503 the GEE model or 0.3418% based on the RE model.

504 (Insert Table 2)

505 Furthermore, the minimum wage increased the ratio of salary expense over total revenue
506 significantly more in full-service hotels than in limited-service hotels when RevPAR remained
507 constant. The interaction term of the minimum wage and the dummy variable for hotel type (1
508 for full-service and 0 for limited-service hotels) [LogMW * Full] were statistically positively
509 significant for all three models (0.8255, $p < 0.01$ in OSL; 0.2985, $p < 0.01$ in GEE; 0.3608, $p <$
510 0.01 in RE). These findings strongly supported hypothesis 1-2: more significant positive
511 influence of the minimum wage on salary expense in full-service hotels than in limited-service
512 hotels. A 1% increase in the minimum wage increased the ratio of salary expense over total
513 revenue by 0.2985% or 0.3608% more in full-service hotels than in limited-service hotels
514 according to the GEE model or the RE model, respectively.

515 (Insert Table 3)

Effect of the minimum wage on ADR

The value of LogRevPAR as a dependent variable represented the change in ADR because all models in Table 4 controlled for the occupancy rate. In this context, we expected a positive coefficient of the minimum wage [LogMW] because hotels would increase their room price (ADR) as the minimum wage increased in order to cover the burden of higher salary expense if the occupancy rate remained constant. The results showed a statistically positively significant relationship between the minimum wage [LogMW] and ADR [LogRevPAR after controlling LogOccupacy constant] in all three models (0.6393, $p < 0.01$ in OSL; 0.3131, $p < 0.01$ in GEE; 0.3679, $p < 0.01$ in RE). At the same time, the relationship between the occupancy rate and RevPAR turned out significantly positive after controlling the minimum wage constant in all three models (1.4481, $p < 0.01$ in OSL; 0.9547, $p < 0.01$ in GEE; 0.9772, $p < 0.01$ in RE), meaning that as the occupancy rate increased, the RevPAR would increase if the minimum wage did not change.

More importantly, the interaction term of the occupancy rate and the minimum wage was statistically positively significant for all three models (0.4418, $p < 0.1$ in OSL; 1.2887, $p < 0.01$ in GEE; 1.2470, $p < 0.01$ in RE), which confirmed the positive moderating effect of the minimum wage on ADR. The findings were robust among the models and strongly supported hypothesis 2-1. In other words, the results showed that when the minimum wage increased by 1%, it increased the ADR by 1.2887% based on the GEE model or 1.2470% according to the RE model if the occupancy rate remained constant (if ADR was $100 then 30% increase in the minimum wage would increase ADR by $38.66 (GEE model) or $37.41 (RE model)).

(Insert Table 4)

However, the effect of the minimum wage on ADR was significantly smaller in full-service hotels than in limited-service hotels. The interaction term of the minimum wage and the type of hotel (1 for full-service hotels and 0 for limited-service hotels) [LogMW * Full] was statistically negatively significant for all three models (-0.7430, $p < 0.01$ in OSL; -0.3521, $p < 0.01$ in GEE; -0.3669, $p < 0.01$ in RE). This finding strongly supported hypothesis 2-2 and showed the relationship between the minimum wage and ADR would be less significant in full-service hotels than in limited-service hotels. The minimum wage increased ADR by 0.3521% or 0.3669% less in full-service hotels than in limited-service hotels based on the GEE model or the RE model.

(Insert Table 5)

Effect of the minimum wage on GOPPAR

Lastly, the effect of the minimum wage on hotels' operating profit was examined by using the value of gross operating per available room [LogGOPPAR] without controlling for either the occupancy rate or room price. Therefore, the dependent variable [LogGOPPAR] enclosed the effect of minimum wage on salary expense, room price, and occupancy rate in the value, which reflected the actual business situations: the minimum wage would increase salary expense and the increased salary expense would increase room price, but the increased room price would decrease the occupancy rate. Different from our expectation, the minimum wage showed a significantly positive effect on GOPPAR in all three models (1.4118, $p < 0.1$ in OSL; 0.7884, $p < 0.01$ in GEE; 0.8500, $p < 0.01$ in RE), which did not support hypothesis 3-1. The results showed that a 1% increase in minimum wage increased GOPPAR either by 0.7884% (GEE model) or 0.8500% (RE model). Thus, if GOPPAR was $50 then a 30% increase in the minimum wage would increase GOPPAR either by $11.83 (GEE model) or by $12.75 (RE

561 model). However, the effect of the minimum wage on GOPPAR between full-service and
562 limited-service hotels was not statistically significant in both GEE and RE models. The evidence
563 supported hypothesis 3-2.

564 (Insert Table 6)

565

566 **5. Conclusion and Discussion**

567 **5.1. Summary of Findings**

568 In contrast with conventional wisdom, this study confirms that minimum wage increases
569 have a positive effect on the operating profitability of hotels (e.g., Kim & Jang, 2020; Lynn &
570 Boone, 2015; Neumark & Wascher, 2002). As the minimum wage increases, hotels tend to
571 absorb the increased salary expenses by raising room prices rather than laying off employees,
572 which ultimately leads to an increase in overall revenue and gross profits. Specifically, the
573 minimum wage increases both salary expense and room price, but the effect of the minimum
574 wage on salary expenses seems to be relatively smaller than its effect on the room price. The
575 findings specify that price adjustment is one of the most prevalent practices when responding to
576 minimum wage increase in both limited-service and full-service hotels (e.g., Basker & Khan,
577 2016; Dube, Naidu, & Reich, 2007; Repetti & Roe, 2018). Despite the greater variability and
578 competition of prices in online market (Abrate, Fraquelli, & Viglia, 2012; Forgacs & Dimanche,
579 2016), increased room prices do not significantly decrease occupancy rate even in limited-
580 service hotels (i.e., customer demand for rooms is less elastic to room price changes even though
581 room price is the most important factor for the limited-service hotel guests) (MaCurdy, 2015;
582 Tanford, Raab, & Kim, 2012). Customers are less sensitive to room prices because hotels within

583 the same geographical market or state can raise prices jointly. Thus, increased room price
584 spurred by minimum wage increase does not hurt demand for hotel rooms much, unlike trading
585 or manufacturing companies whose product prices are influenced by different levels of minimum
586 wage in different locations (e.g., Harasztosi & Lindner, 2019).

587 The inferences become clearer when the effects of the minimum wage on room prices are
588 compared between full-service and limited-service hotels. As the minimum wage increases,
589 salary expense increases more in full-service hotels than in limited-service hotels, which
590 suggests that hotels can react differently to increased salary expenses (Harasztosi & Lindner,
591 2019; MaCurdy, 2015). This is because the labor markets and revenue resources of limited-
592 service hotels are different from those of full-service hotels. In other words, full-service hotels
593 require relatively more minimum wage employees than limited-service hotels, including
594 restaurant staff and entry-level employees in the spa, banquet services, and other departments.
595 However, despite the greater burden of salary expense, full-service hotels can spread the
596 expenses caused by minimum wage increases to other departments, while limited-service hotels
597 mainly rely on rooms revenue. Consequently, the effects of the minimum wage on room prices
598 are more significant in limited-service hotels than in full-service hotels, and these findings
599 support our expectations.

600 Despite the difference in salary expenses and price increases, this study does not find a
601 significant difference in the effect of the minimum wage on operating profitability between full-
602 service and limited-service hotels. However, the relationship between the minimum wage and
603 gross operating profit turns out to be positive, which is similar to the findings of a few studies in
604 the restaurant industry (e.g., Kim & Jang, 2019; 2020). Surprisingly, the increased room price of
605 limited-service hotels does not decrease customer demand significantly. Therefore, in this study

606 we conclude that limited-service hotels respond more rapidly to minimum wage increases than
607 full-service hotels by collectively raising their room prices. On the other hand, full-service hotels
608 tend to absorb the shock of minimum wage increases by increasing labor productivity through
609 highly skilled employees and efficiently spreading out the expenses over different departments.
610 Similar to limited-service hotels, full-service hotels also increased their room prices, which also
611 contributes to their positive operating profitability. Overall, the results show that limited-service
612 hotels pass on minimum wage increases entirely to customers. Full-service hotels paid some of
613 the increase in minimum wage, but they still shared it with customers.
614

615 **5.2. Contributions and Implications**

616 Previous studies that examine the effects of the minimum wage have mostly focused on
617 the restaurant industry and its impact on employment. Despite the significant roles of the hotel
618 industry in tourism labor markets, an effort to understand the effects of the minimum wage on
619 hotel operating performance is very scarce. Besides, these studies relied mostly on a difference-
620 in-differences model, which requires a few concrete assumptions, such as the constant time-
621 invariant effects of the unmeasured determinants for the control and treated groups (e.g.,
622 Lechner, 2011; Wing, Simon, & Bello-Gomez, 2018). However, this quasi-experimental design
623 may not be appropriate for measuring the effects of the continuously changing variable, with
624 different magnitudes, over the years. In this context, different approaches are necessary to test
625 the validity of the findings and justify the implications: in this study we applied the generalized
626 estimating equation (GEE) and two-way random-effects regression (RE) models with the
627 interaction term of the minimum wage as an alternative approach. Therefore, this study makes
628 several contributions to the literature and the industry in unique ways: it 1) expands the findings

into the hotel industry, 2) examines the effects of the minimum wage from the aspect of hotels rather than employment, 3) applies different methods other than a difference-in-differences model to achieve more representative and robust results, and 4) provides consistent outcomes from simple descriptive information analysis to complex regression analysis. Moreover, the data analysis is based at the property level and thus provides more practical implications for both full-service and limited-service hotels.

The findings indicate the pricing practices of hotels in response to minimum wage changes and show the dissimilar labor cost pressure between full-service and limited-service hotels. The impact of minimum wage increases can be absorbed by increasing prices (e.g., Card & Krueger, 1995; Aaronson et al., 2008; Lemos, 2006; MacDonald & Aaronson, 2006), and full-service hotels have more options to spread the impact than limited-service hotels do. In other words, although the positive impact of the minimum wage on GOPPAR is not significantly different between full-service hotels and limited-service hotels, the pricing strategies of full-service hotels are more complicated but, at the same time, can be more flexible, which would be more beneficial under unexpected circumstances. For example, full-service hotels can absorb the pressures of labor costs by sharing employees between departments or increasing other revenues, such as banquet services to residents, when unpredicted political or environmental disarray are expected to cause low room demand. Considering the impact of the minimum wage on labor costs and operating profits, the level of skills is expected to be a key issue for both the minimum wage and regular workers in the hotel industry. Rather than focusing on one particular skill, hotels and tourism educational institutions need to train employees or students who can work in various departments.

Lastly, but more importantly, the findings indicate that increased minimum wage encourages wealth redistribution for minimum wage employees since they receive higher income, and hotel guests (i.e., tourists) pay higher prices for their leisure activities. In both full-service and limited-service hotels, income from tourists can be reallocated to low-wage workers to make up for increases in the minimum wage without hotels losing operation profits. This also implies that the hotel industry is under less pressure from minimum wage increases than other industries are. Therefore, increased minimum wage can play a beneficial role not only for the hotel industry but also for local society.

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Table 1. Statistical information

	All	MW change (Yes)	MW change (No)	Full-service	Limited-service
RevPAR($)	92.21	98.46	87.61	132.24	64.24
	(66.14)	(72.02)	(61.06)	(78.70)	(34.67)
Occupancy %	73.17	73.77	72.73	73.12	73.21
	(10.14)	(10.50)	(9.84)	(9.98)	(10.24)
ADR($)	124.23	131.08	119.20	178.67	86.19
	(85.14)	(92.45)	(78.94)	(101.80)	(39.44)
GOPPAR($)	47.87	51.78	45.00	67.55	34.12
	(36.26)	(39.06)	(33.77)	(43.60)	(21.11)
Total salary	36.93	39.41	35.11	70.37	13.57
expensePAR($)	(51.64)	(55.58)	(48.47)	(66.85)	(9.04)
Total salary expense	26.46	26.10	26.72	34.07	21.14
/Total revenue %	(10.18)	(10.29)	(10.09)	(10.34)	(5.72)
Minimum Wage ($)	7.89	8.13	7.72	8.00	7.82
	(0.84)	(1.09)	(0.51)	(0.86)	(0.81)
Year of operation	22.03	21.39	22.50	27.65	18.10
	(15.21)	(15.30)	(15.13)	(19.89)	(8.90)
Number of rooms	236.65	238.68	235.16	398.69	123.44
	(258.89)	(258.54)	(259.16)	(339.97)	(44.19)
Observations	10,664	4,513	6,151	4,386	6,278

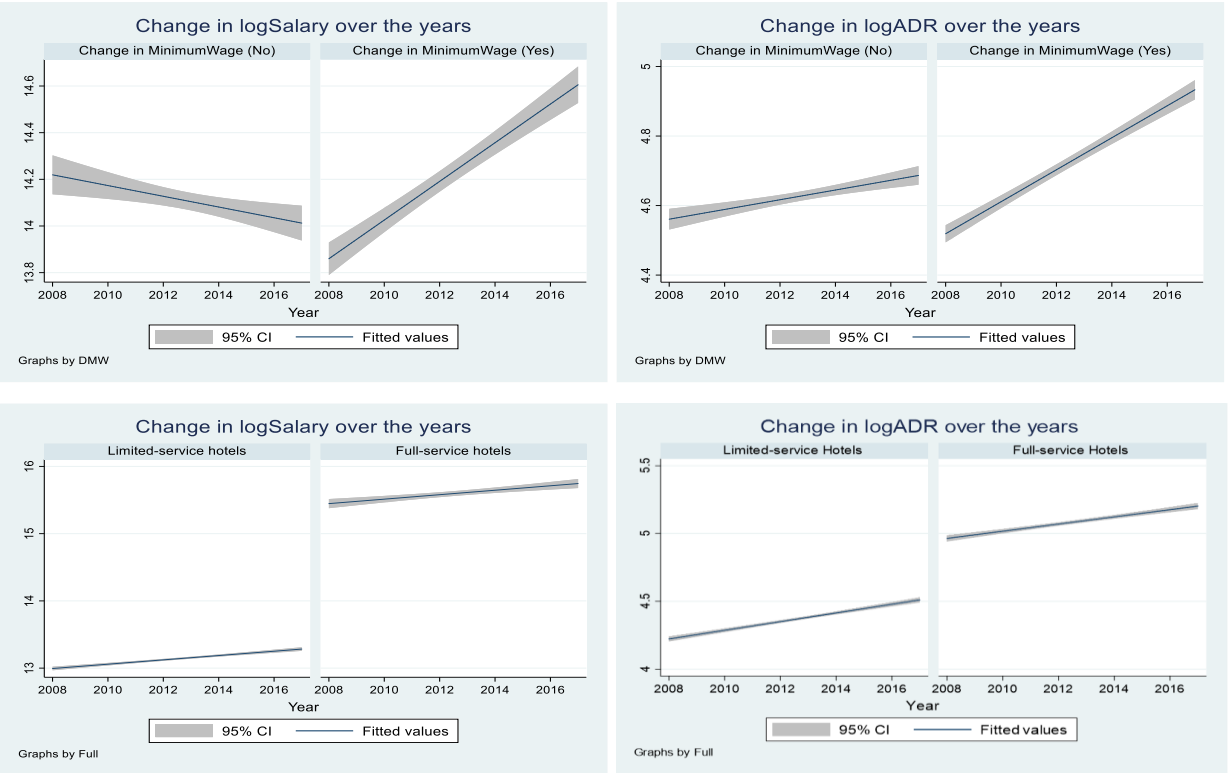

Figure 1. Changes in salary expense and ADR over the years

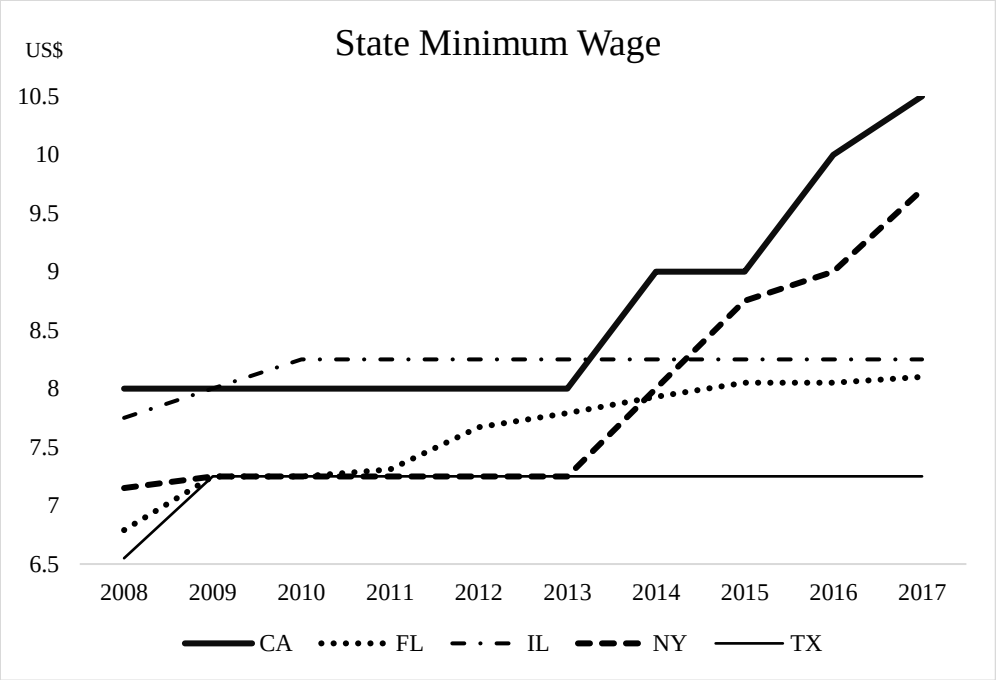

Figure 2. State minimum wage from 2008 to 2017

Table 2. Effect of minimum wage (MW) on a hotel firm's salary expense

	DV: Log (Total salary expense/Total revenue)					
	OLS	GEE	RE	OLS	GEE	RE
LogRevPAR	-0.1753***	-0.7115***	-0.4976***	-0.1665***	-0.7042***	-0.4886***
	(0.0099)	(0.0151)	(0.0188)	(0.0100)	(0.0148)	(0.0190)
LogRevPAR * LogMW	-	-	-	0.4752***	0.2912***	0.3418***
				(0.0512)	(0.0380)	(0.0410)
LogMW	0.1058***	0.0283	-0.0595	0.0182	-0.1321***	-0.2368***
	(0.0351)	(0.0353)	(0.0379)	(0.0352)	(0.0422)	(0.0461)
Class	-0.1456***	-0.0185***	-0.0752***	-0.1428***	-0.0189***	-0.0750***
	(0.0034)	(0.0047)	(0.0082)	(0.0034)	(0.0046)	(0.0081)
Location	-0.0010	-0.0037	0.0010	-0.0017	-0.0036	0.0010
	(0.0021)	(0.0042)	(0.0061)	(0.0021)	(0.0042)	(0.0061)
Year of operation	0.0033***	-0.0003	0.0015*	0.0031***	-0.0004	0.0014*
	(0.0002)	(0.0005)	(0.0008)	(0.0002)	(0.0005)	(0.0008)
Size	0.0930***	0.0166**	0.0438***	0.0937***	0.0165**	0.0443***
	(0.0033)	(0.0065)	(0.0100)	(0.0032)	(0.0065)	(0.0100)
Log state total revenue	-0.0900***	-0.1422***	-0.1000***	-0.1026***	-0.1234***	-0.0915***
	(0.0071)	(0.0343)	(0.0272)	(0.0072)	(0.0339)	(0.0271)
Log state monthly employment	0.3313***	1.5338***	1.1425***	0.3158***	1.6021***	1.2348***
	(0.0976)	(0.0838)	(0.1031)	(0.0975)	(0.0840)	(0.1014)
Year	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-3.9351***	-18.7634***	-14.3394***	-4.0211***	-23.1963***	-18.1947***
	(1.4576)	(0.9817)	(1.3443)	(1.4921)	(1.0494)	(1.3934)
Observations	10,627					
Adjusted R^2	0.51	-	0.01	0.51	-	0.01
Wald Chi^2	-	5,248***	3,854***	-	5,243***	3,776***

Note: OLS is ordinary linear regression; GEE is generalized estimating equation; RE is a two-way random-effects model; LogMW is the natural log of state's minimum wage; when a model includes an interaction term of LogRevPAR*LogMW, the model uses the mean centered value of LogRevPAR and LogMW to avoid the multicollinearity; bracket is robust standard errors; *significant at 10%; **significant at 5%; ***significant at 1%.

Table 3. Moderating effect of full-service hotel on the relationship between the minimum wage (MW) and a hotel firm's salary expense

	DV: Log (Total salary expense/Total revenue)		
	OLS	GEE	RE
LogRevPAR	-0.1724***	-0.6955***	-0.5130***
	(0.0093)	(0.0151)	(0.0183)
LogMW	-0.3162***	-0.1255***	0.2290***
	(0.0378)	(0.0432)	(0.0478)
LogMW * Full	0.8255***	0.2985***	0.3608***
	(0.0524)	(0.0465)	(0.0510)
Full	0.2529***	0.1488***	0.2943***
	(0.0083)	(0.0181)	(0.0254)
Class	-0.1038***	-0.0205***	-0.0664***
	(0.0034)	(0.0047)	(0.0073)
Location	-0.0023	-0.0035	-0.0010
	(0.0019)	(0.0043)	(0.0056)
Year of operation	0.0031***	-0.0003	0.0014**
	(0.0002)	(0.0005)	(0.0007)
Size	0.0526***	0.0161**	0.0291***
	(0.0034)	(0.0065)	(0.0088)
Log state total revenue	-0.0939***	-0.1403***	-0.0952***
	(0.0069)	(0.0332)	(0.0241)
Log state monthly employment	0.4047***	1.5163***	1.1451***
	(0.0858)	(0.0831)	(0.0944)
Year	Yes	Yes	Yes
Constant	-4.9079***	-18.6033***	-14.6347***
	(1.3076)	(1.0308)	(1.3016)
Observations	10,627		
Adjusted R^2	0.56	-	0.31
Wald Chi^2	-	5,059***	4,840***

Note: OLS is ordinary linear regression; GEE is generalized estimating equation; RE is a two-way random-effects model; LogMW is the natural log of state's minimum wage; Full is a dummy variable 1 for full-service hotels and 0 for limited-service hotels; when a model includes an interaction term of LogRevPAR*LogMW, the model uses the mean centered value of LogRevPAR and LogMW to avoid the multicollinearity; bracket is robust standard errors; *significant at 10%; **significant at 5%; ***significant at 1%.

Table 4. Effect of minimum wage (MW) on a hotel firm's ADR

	DV: LogRevPAR					
	OLS	GEE	RE	OLS	GEE	RE
LogOccupancy	1.4481***	0.9547***	0.9772***	1.4575***	0.9902***	1.0110***
	(0.0215)	(0.0198)	(0.0199)	(0.0230)	(0.0203)	(0.0203)
LogOccupancy * LogMW	-	-	-	0.4418*	1.2887***	1.2470***
				(0.2535)	(0.1516)	(0.1520)
LogMW	0.6393***	0.3131***	0.3679***	0.6212***	0.1758***	0.2358***
	(0.0392)	(0.0391)	(0.0401)	(0.0407)	(0.0380)	(0.0392)
Class	-0.2756***	-0.0298***	-0.0736***	-0.2757***	-0.0289***	-0.0721***
	(0.0025)	(0.0037)	(0.0058)	(0.0025)	(0.0038)	(0.0057)
Location	-0.0013	0.0117***	0.0146***	-0.0012	0.0119***	0.0148***
	(0.0022)	(0.0043)	(0.0048)	(0.0022)	(0.0044)	(0.0049)
Year of operation	0.0009***	0.0006	0.0010	0.0009***	0.0006	0.0010
	(0.0003)	(0.0005)	(0.0007)	(0.0003)	(0.0005)	(0.0007)
Size	0.0065*	-0.0076	-0.0034	0.0064*	-0.0074	-0.0032
	(0.0034)	(0.0056)	(0.0078)	(0.0034)	(0.0057)	(0.0078)
Log state total revenue	0.1152***	0.4476***	0.3333***	0.1124***	0.4383***	0.3283***
	(0.0069)	(0.0312)	(0.0281)	(0.0071)	(0.0321)	(0.0285)
Log state monthly employment	-0.4688***	-0.3501***	-0.2520***	-0.4682***	-0.2483***	-0.1571***
	(0.1221)	(0.0664)	(0.0719)	(0.1221)	(0.0719)	(0.0754)
Year	Yes	Yes	Yes	Yes	Yes	Yes
Constant	2.7332***	-3.5676***	-2.9241***	10.2954***	-0.2780	0.6620
	(1.8225)	(0.7660)	(0.9324)	(1.8801)	(0.8822)	(1.0269)
Observations	10,664					
Adjusted R^2	0.80	-	0.54	0.80	-	0.54
Wald Chi^2	-	20,136***	19,906***	-	20,503***	20,475***

Note: OLS is ordinary linear regression; GEE is generalized estimating equation; RE is a two-way random-effects model; LogMW is the natural log of state's minimum wage; when a model includes an interaction term of LogRevPAR*LogMW, the model uses the mean centered value of LogRevPAR and LogMW to avoid the multicollinearity; bracket is robust standard errors; *significant at 10%; **significant at 5%; ***significant at 1%.

Table 5. Moderating effect of full-service hotel on the relationship between the minimum wage (MW) and ADR

	DV: LogRevPAR		
	OLS	GEE	RE
LogOccupancy	1.4529***	0.9594***	0.9821***
	(0.0211)	(0.0196)	(0.0197)
LogMW	0.9194***	0.4954***	0.5558***
	(0.0399)	(0.0476)	(0.0482)
LogMW * Full	-0.7430***	-0.3521***	-0.3669***
	(0.0538)	(0.0528)	(0.0537)
Full	0.0863***	0.0368***	0.1280***
	(0.0097)	(0.0143)	(0.0186)
Class	-0.2640***	-0.0299***	-0.0695***
	(0.0029)	(0.0037)	(0.0055)
Location	-0.0004	0.0119***	0.0141***
	(0.0022)	(0.0043)	(0.0046)
Year of operation	0.0011***	0.0007	0.0010
	(0.0003)	(0.0005)	(0.0007)
Size	-0.0090**	-0.0087	-0.0093
	(0.0039)	(0.0056)	(0.0074)
Log state total revenue	0.1235***	0.4343***	0.3209***
	(0.0069)	(0.0300)	(0.0245)
Log state monthly employment	-0.4542***	-0.3706***	-0.2809***
	(0.1151)	(0.0663)	(0.0709)
Year	Yes	Yes	Yes
Constant	3.6153***	-2.3837***	-1.5566***
	(1.7636)	(0.8121)	(0.9566)
Observations		10,664	
Adjusted R^2	0.80	-	0.62
Wald Chi^2	-	20,464***	19,781***

Note: OLS is ordinary linear regression; GEE is generalized estimating equation; RE is a two-way random-effects model; LogMW is the natural log of state's minimum wage; Full is a dummy variable 1 for full-service hotels and 0 for limited-service hotels; when a model includes an interaction term of LogMW*Full, the model uses the mean centered value of LogMW to avoid the multicollinearity; bracket is robust standard errors; *significant at 10%; **significant at 5%; ***significant at 1%.

Table 6. Effect of minimum wage (MW) on a hotel firm's GOPPAR

	DV: LogGOPPAR					
	OLS	GEE	RE	OLS	GEE	RE
LogMW	1.4118***	0.7884***	0.8500***	1.9291***	0.7222***	0.7950***
	(0.0634)	(0.0993)	(0.0994)	(0.0698)	(0.0994)	(0.0999)
LogMW * Full	-	-	-	-1.2961***	0.1601	0.1199
				(0.0918)	(0.1238)	(0.1237)
Full	-	-	-	0.0650***	0.1593***	0.1844***
				(0.0167)	(0.0328)	(0.0326)
Class	-0.1980***	-0.0824***	-0.1020***	-0.1910***	-0.0767***	-0.0903***
	(0.0042)	(0.0098)	(0.0098)	(0.0049)	(0.0097)	(0.0098)
Location	0.0014	0.0320***	0.0303***	0.0031	0.0301***	0.0280***
	(0.0041)	(0.0117)	(0.0109)	(0.0041)	(0.0113)	(0.0105)
Year of operation	-0.0012***	0.0007	0.0005	-0.0009**	0.0005	0.0003
	(0.0004)	(0.0011)	(0.0011)	(0.0004)	(0.0011)	(0.0011)
Size	0.0977***	0.0043	0.0191	0.0848***	-0.0029	0.0061
	(0.0065)	(0.0176)	(0.0169)	(0.0072)	(0.0173)	(0.0168)
Log state total revenue	0.2282***	0.6947***	0.5843***	0.2415***	0.6615***	0.5641***
	(0.0135)	(0.0498)	(0.0440)	(0.0135)	(0.0478)	(0.0429)
Log state monthly employment	-1.3622***	-1.5318***	-1.3989***	-1.3581***	-1.4832***	-1.3675***
	(0.1886)	(0.1878)	(0.1844)	(0.1820)	(0.1840)	(0.1802)
Year	Yes	Yes	Yes	Yes	Yes	Yes
Constant	17.5451***	12.1091***	12.1401***	20.1217***	13.5804***	13.7352***
	(2.8181)	(2.5441)	(2.5606)	(2.7867)	(2.6376)	(2.6412)
Observations	10,634					
Adjusted R^2	0.48	-	0.36	0.49	-	0.40
Wald Chi^2	-	3,499***	3,657***	-	3,671***	3,851***

Note: OLS is ordinary linear regression; GEE is generalized estimating equation; RE is a two-way random-effects model; LogMW is the natural log of state's minimum wage; Full is a dummy variable 1 for full-service hotels and 0 for limited-service hotels; bracket is robust standard errors; *significant at 10%; **significant at 5%; ***significant at 1%.