Tourism Economics, 2014, 20 (4), 695–725 doi: 10.5367/te.2013.0304

Wage differentials and their determinants in US tourism and tourism-associated industries

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This paper examines variations in wages for tourism and tourism-associated industries in the USA for the period 2004–2009. It critically assesses the extent to which tourism and tourism-associated activities conform to their low-wage stereotype and finds this to be true in general, but not universally. It then considers the possibility that wages in US tourism and tourism-associated industries can be explained by observable characteristics of these industries. Recent research suggests that the use of wage data at the level of highly detailed occupations is an effective alternative to other ways of capturing underlying skill differences. Accordingly, data from the US *Occupational Employment Statistics* (OES) were used to provide this detail. The results strongly support the importance of difference in wages between occupations in understanding differences between industries. They also support the importance of a number of industry characteristics, including profitability, multi-factor productivity and demand growth. The paper also considers the relevance of an industry wage premium or discount for tourism and tourism-associated activities in the USA over the same period. It estimates an industry wage model separately for five individual occupations across all industries that employ for the occupation concerned. The analysis shows that workers in the two more highly paid occupations exhibit evidence of a tourism and tourism-associated discount but that workers in the three more lowly paid occupations exhibit a tourism and tourism-associated wage premium.

Keywords: wages; occupations; tourism industry; skills; US tourism

Tourism and tourism-associated industries are frequently characterized as low skill, low wage activities. There is some truth in this view but it may be too simplistic. This paper looks at tourism and tourism-associated industries in the USA over the period 2004–2009 and finds that a minority actually exhibit

I am indebted to a number of anonymous referees for useful comments on earlier versions of this paper. I am also very grateful to Professor Jenny Piesse for her comments on a draft.

higher industry averages than the economy as a whole. The industries considered are not just those directly involved in providing services to consumers but also include those devoted to supporting them (such as services supporting air transportation). All those included are also included in the US Tourism and Travel Satellite Accounts (TTSA). Further details are provided below.

To the extent that the low skill, low wage representation is correct it may still not be an adequate view of wages in tourism and tourism-associated industries. For example, no matter how far skills in the workforce are increased some low skill workers will always remain. A sector that offers low skilled workers better paid opportunities than alternative industries would, therefore, still have some attraction. One of the objectives of this paper is to assess whether tourism and tourism-associated activities offer a wage premium or wage discount relative to other US industries employing workers in the same occupation. For reasons that are discussed later there are only a small number of occupations for which such analysis can be undertaken.

Thrane (2008) notes the literature on the economics of tourism has tended to focus on demand – the analysis of tourists and their behaviour – rather than on the supply of tourism. Another objective of this paper is to contribute to the literature on supply issues in tourism and, in particular, those relating to wages. To this end the paper offers an analysis of industry wages for US tourism and tourism-associated activities over the period 2004–2009. The foundation of this approach is a fairly standard wage equation originating from Mincer (1974), with developments from a number of subsequent authors. There are, however, a number of key differences from the traditional approach of this type, which sees the log of wages as related to experience and education as measures of the underlying skills. An alternative approach is to use highly detailed occupational categories to capture these skill effects. This is the approach adopted in this paper. The majority of previous studies such as Martins (2004) or Heyman *et al* (2007) use micro-level data based on surveys of individuals to estimate such relationships. To allow for occupational detail a different micro-level data set is required and this study uses the US *Occupational Employment Statistics* (OES).

Literature review

As noted before the supply-side of tourism has tended to be under researched. In particular, labour market aspects of tourism have not been covered extensively in the literature. There is however a small and growing body of research emerging on wages in tourism. Thrane (2008) is a notable example. He provides an analysis of wages in Norwegian tourism, finding differences between male and female wages and important roles for experience and socio-demographic variables in wage determination. Thrane (2010), again using evidence from Norway, found evidence of 'sheepskin' effects (returns to a degree over and above the effects of additional years of education) on wages in the tourism industry. Lillo-Banuls and Casado-Diaz (2010) analysed private returns to education in Spanish tourism, finding little difference between tourism and the rest of the Spanish economy. Muñoz-Bullón (2009) examined differences in wages between male and female workers in Spain's tourism sector, finding that male workers were better paid.

Campos-Soria *et al* (2009) provided estimates of the differences between male and female pay in the hospitality sector in Andalusia. Their paper also confirms a common and wider perception of tourism – that it is characterized by low wages. Marchante *et al* (2005) also consider wages in hotels and restaurants in Andalusia, providing estimates of the effects of educational mis-match. Barros and Santos (2009) provide comparative estimates of the effects of human and social capital upon the wages of hotel managers in Portugal. Delfim Santos and Varejão (2007) provide an empirical analysis of the tourism industry in Portugal, with particular emphasis on gender discrimination. They find tourism in Portugal to be both low paid and low skilled. Szivas *et al* (2003) analyse labour mobility in UK tourism, finding little significance in location effects. Choy (1995) addresses criticisms that employment in tourism is 'demeaning' (interpreted as low paid, low skilled employment) using data from tourism related sectors in Hawaii, finding a high level of job satisfaction in workers and wages which were sometimes low, sometimes not. Although not specifically related to wages in tourism the finding by Brent Ritchie *et al* (2010) that tourism in the USA has been adversely affected by the economic crisis of 2008–2009, suggests that such cyclical effects should also be borne in mind in the context of wages.

The literature on wages in tourism fits within two broader perspectives: the literature on tourism economics and the literature on labour economics. Input–output modelling has long been used for modelling the economic impact of tourism, including that on employment and wages – see Fletcher (1989) for a good discussion of this approach. Daniels *et al* (2004) extends input-output modelling to incorporate a decomposition of the effects on different occupational categories. Although this paper does not utilize input–output techniques it does share with Daniels *et al* (2004) an emphasis on occupational wages. Blake *et al* (2008) examine the effects of tourism on the Brazilian economy through three channels – prices, wages and government revenues – using a computable general equilibrium model. They find important effects of tourism on real wages which vary according to skill level, with semi-skilled and unskilled workers gaining the least.

The context of the US economy is, of course, very different from that of Brazil but some of the concerns about the potential benefits for the least advantaged workers are similar. There is a long tradition of studies of the pattern of specialization in international trade which show the US to be specialized in producing and exporting goods intensive in highly educated labour – see, for example, Maskus *et al* (1994) or Gould (2002). A later and more spirited debate in both the labour economics and international trade literature has focused on the reasons for growing wage inequality in the USA and other countries. Machin (2008) provides a good overview of this literature.

Within labour economics the seminal empirical papers on inter-industry wage differentials have been those by Dickens and Katz (1987) and Krueger and Summers (1988), who put forward the *efficiency wage* approach – see also Gibbons and Katz (1992). In this approach firms pay higher wages for higher productivity workers. The dominant specification in this field is based upon that originally put forward by Mincer (1974) in which the log of wages is explained by variables such as education and experience. Studies of this type are typically undertaken using micro-level data, usually at the individual level

and often with matched employer–employee data. These studies, almost without exception, tend to find that persistent differences in wages exist between industries. Recent examples include work by Du Caju *et al* (2011) which finds a link between wages and profits in Belgium, suggesting rent sharing effects of the type found in the USA by Blanchflower *et al* (1996). Du Caju *et al* (2010), using an approach based on extended Mincer equations find evidence for the effects of rent sharing on wages for a wider sample of European countries. Lundin and Yun (2009), using matched employer–employee data for Sweden find effects of both technology and trade on inter-industry wage differences.

Martins (2004), using Portuguese data, finds evidence for the unobservable quality differences between workers as an explanation of inter-industry wage differences. Chen and Edin (2002) find evidence from Swedish blue collar workers that inter-industry wage differences are consistent with efficiency wage effects. Hibbs and Locking (2000) argue that a series of institutional factors may be an important reason for inter-industry wage differences. A closely related strand in the literature is the empirical analysis of foreign ownership wage premia, such as that presented by Heyman *et al* (2007). They econometrically estimate a wage premium for a sample of Swedish firms using a regression equation with a dummy variable for foreign ownership and a set of firm level variables. Although this study uses industry and occupational rather than firm level data, the essence of the approach used in this paper is very similar. Girma and Gorg (2007) conduct a similar firm level analysis of the effects of foreign ownership on wages for a sample of UK firms.

Links between wages and productivity or technology measures within panels of workers have been explored in the labour economics literature for some time. Sicherman and Bartel (1999) find a link between various measures of technological progress, including two different productivity measures and wages. Although their findings support an observable link between technologically dynamic industries and high wages they also find evidence of unexplained (unobserved) differences between individuals. Total factor productivity measures in particular have continued to be used in recent studies of wages and wage differences. For example, Aiyar and Dalgaard (2005) find an empirical link between differences in wages between countries and differences in total factor productivity.

Two further influences on wage differences that have not been explored much in the literature are the effects of regional variations in wages and occupational variations. Several studies have found important variations between different regions within the same country, both in wages and in industry structure. One recent example is the study of the UK by Bernard *et al* (2008) in which they find important variations between regions of the UK in both relative wages and industry structure. To accommodate the possibility of regional wage variations within the US the analysis presented in this paper includes regional variables. Osburn (2000), using the US Occupational Employment Statistics (OES) rather than matched individual data, finds that industry wage differences are generally uniform across different occupations in the USA. This paper uses the same database (OES).

Average wages in US tourism and tourism-associated industries

Table 1 presents annual wages by four-digit North American Industry Classification System (NAICS) industries for tourism and tourism-associated economic

Table 1. Mean annual wages by industry, USA, 2009.

A. Tourism and tourism associated industries			B. Comparison industries		
NAICS code	Description	Mean annual wage (US$)	NAICS code	Description	Mean annual wage (US$)
4811	Scheduled air transportation	53,990		*Mean – tourist related industries*	*25,874*
4812	Non-scheduled air transportation	59,300		*Mean – all industries*	*43,465*
4821	Rail transportation	55,070	*Highest wage industries:*		
4831	Deep sea, coastal, lakes transportation	57,920	5232	Securities and commodity exchanges	94,470
4851	Urban transit systems	34,820	3341	Computer etc equipment manufacture	88,140
4852	Interurban and rural bus transportation	34,440	5239	Other financial investment activities	88,010
4853	Taxi and limousine service	29,130	5112	Software publishers	84,990
4855	Charter bus industry	31,590	5231	Securities and commodity intermediation	84,880
4859	Other transit & ground passenger transport	29,200	5417	Scientific research and development	80,210
4871	Scenic and sightseeing transportation, land	31,540	5415	Computer systems design etc services	80,050
4872	Scenic & sightseeing transportation, water	33,930	5411	Legal services	73,770
4879	Scenic & sightseeing transportation, other	50,770	2111	Oil and gas extraction	71,550
4881	Support activities for air transportation	39,600	5259	Other investment pools and funds	70,920
4882	Support activities for rail transportation	36,720	5416	Management, scientific, technical consulting	70,330
4883	Support activities for water transportation	52,190	5191	Other information services	68,790
4884	Support activities for road transportation	32,560	*Lowest wage industries:*		
5321	Automotive equipment rental and leasing	32,850	8121	Personal care services	26,960
5615	Travel arrangement and reservation services	38,390	5617	Services to buildings and dwellings	26,820
7111	Performing arts companies	47,780	4532	Office supplies, stationery, and gift stores	26,340
7112	Spectator sports	40,220	4452	Specialty food stores	25,510
7113	Promoters of performing arts, sports, etc	36,140	4511	Sporting goods, hobby, etc stores	25,380
7114	Agents & managers for artists, athletes, etc	72,080	8123	Drycleaning and laundry services	25,370
7115	Independent artists, writers, performers	56,280	4451	Grocery stores	25,050
7121	Museums, historical sites, etc	35,700	4453	Beer, wine, and liquor stores	24,930
7131	Amusement parks and arcades	27,140	4481	Clothing stores	24,470

Table 1 continued.

A. Tourism and tourism associated industries			B. Comparison industries		
NAICS code	Description	Mean annual wage (US$)	NAICS code	Description	Mean annual wage (US$)
7132	Gambling industries	27,880	4482	Shoe stores	24,440
7139	Other amusement and recreation industries	28,060	4533	Used merchandise stores	24,200
7211	Traveller accommodation	26,730	6244	Child day care services	24,180
7212	RV parks and recreational camps	27,180	4531	Florists	24,020
7213	Rooming and boarding houses	25,790	4521	Department stores	23,890
7221	Full-service restaurants	21,970	4529	Other general merchandise stores	23,520
7222	Limited-service eating places	19,450	4512	Book, periodical, and music stores	23,490
7223	Special food services	25,430	1151	Support activities for crop production	22,680
7224	Drinking places (alcoholic beverages)	21,560	4471	Gasoline stations	21,410

Source: OES database, US Bureau of Labor Statistics.

activities in the USA in 2009. The NAICS classification is the standard classification of industries currently in use in the USA. Further details can be found at: http://www.census.gov/eos/www/naics/. Data by NAICS four-digit industry were taken from the Occupational Employment Statistics (OES) database published by the US Bureau of Labor Statistics (BLS). The definition of tourist and tourism-associated industries is closely based upon but not identical to those defined in the tourism satellite accounts for the US published by the Bureau of Economic Analysis (US Department of Commerce). For the purpose of comparison Table 1 also lists the industries with highest and lowest annual wages in 2009.

The data presented in Table 1 confirm with regard to the USA what research has found in other countries. That is, tourism and tourism-associated activities are not universally low wage industries. A number of the 'industries' listed – essentially air, rail and water transportation – had industry averages in 2009 in excess of the overall average for the US economy. Nonetheless, the majority of the tourism and tourism-associated sectors did exhibit industry average wages below the overall average. Indeed the industry with the lowest recorded average wage, limited service eating places, falls in the list of tourism and tourism-associated activities. The best simple characterization for the USA in 2009 is that tourism and tourism-associated sectors were, on balance, low paid but not universally so. The issue of whether tourism and tourism-associated industries are inherently 'low wage' is, therefore, worthy of further investigation.

Model specification and data

Model specification and hypotheses

The basic model specification is an adaptation of the Mincer (1974) equation and related to the specification used by Abowd *et al* (2003). That is, the log of wages at time t in industry j, and for occupation k, are related to a series of industry characteristics in the following way:

$$\ln(w_{jkt}) = c + \beta.X_{jkt} + \delta_j + \theta_k + \eta_t + u_{jkt}, \quad (1)$$

where w_{jkt} is the annual wage for occupation k in industry j at time t, c is a constant, X_{kt} a vector of industry variables and β the relevant coefficients, δ_j a vector of coefficients capturing unobserved industry effects, $\theta._k$ a vector of coefficients capturing unobserved differences by occupation, η_t a vector of time varying parameters and u_{jkt} a disturbance term. In terms of panel estimators with more two sets of fixed effects this is, essentially, what Andrews *et al* (2006) refer to as the least squares dummy variable model. This model uses dummy variables to capture effects at the level of industry, occupation and time period that we cannot directly observe. Note that, if the variables X_{jkt} provide an adequate representation of the effects of industry characteristics on wages the omission of the term to capture unobserved industry effects, δ_j, should make little difference to the explanatory power of the model.

This model, although clearly linked to other industry wage models, has important differences. First, it does not use data measured at the individual

level, whether or not matched by employer and employee. The reasons for the choice of the OES dataset and, hence, a different model specification in this respect are set our below. Second, the traditional Mincer (1974) model uses variables such as experience or education. The model specification here focuses much more on industry variables. That is, the model seeks to explain wages in tourism and tourism-associated industries in terms of the characteristics of these industries and unobserved occupation and time effects.

The industry variables used comprise:

- *age* – the mean age of workers in industry *j*;
- *ptr* – the proportion of workers in industry *j* recorded as part-time;
- *fem* – the proportion of female workers in industry *j*;
- *midw* – the share of the Mid-West region in employment in industry *j*;
- *south* – the share of the South region in employment in industry *j*;
- *west* – the share of the West region in employment in industry *j*;
- *mfpi* – the index of multi-factor productivity for industry *j*;
- *pre* – gross operating surplus per full-time equivalent for industry *j*;
- *qid* – proportionate change in industry turnover relative to the previous year;
- *exs* – export to sales ratio for industry *j*;
- *imp* – import penetration (share of imports in total market j).

This basic model is applied in two different contexts. First, an analysis of wages in tourism and tourism-associated industries in the USA is conducted. This uses a sample of (NAICS four-digit) tourism and tourism-associated industries and seeks to identify how industry characteristics affect wages in these industries. Second, the model is applied to a different but related question: Is there a wage premium or discount associated with tourism and tourism-associated industries in the USA? To assess this requires a different version of the model. With respect to industries the sample needs to be extended to include other industries to allow systematic differences between tourism and tourism-associated and other industries to be captured. However, any accurate measurement of industry premia or discounts must, as far as possible, allow for a like-for-like comparison between industries with respect to occupation. For example, comparing average wages at the industry level between, say, software publishing and grocery stores involves comparing very different occupational characteristics. To avoid this is not easy to accomplish because very few occupations are employed in a wide variety of industries. The approach taken in this paper is to take a small number of precisely defined occupations such as 'accountant and auditors' and estimate an industry wage relationship for each individual occupation. Thus the model specified in Equation (1) loses the occupational dimension and becomes:

$$\ln(w_{jt}) = c + \beta.X_{jt} + \delta_j + \eta_t + u_{jkt}, \quad (2)$$

where variables and subscripts are as previously defined.

The core hypothesis to be tested by the model of tourism and tourism-associated industry wages (Equation (1)) is that there is a reasonable common explanation of the influence of industry characteristics on wages – that the model represents well industry wages within the sector. For consistency with earlier research we should expect industry wages to be positively correlated with

the mean age, multi-factor productivity, gross operating surplus (rent sharing effects), sales growth and export to sales ratios. Likewise we should expect a negative correlation between industry wages and the share of both female and part-time workers and import penetration.

With respect to the estimation for single occupations across all industries the most important hypotheses concern the industry fixed effect parameters, which capture those unobserved industry effects not included in the model – the industry wage premium or discount. There are two closely related hypotheses involved. First, that after accounting for differences in occupational composition (by taking a single occupation) and industry characteristics a statistically significant 'unobserved' industry effect remains – an industry premium or discount. Second, for tourism to be an inherently low wage sector would require these fixed effects to be negative; that these unobserved industry effects are negative.

Data

Data on the following variables were taken from the US Current Population Survey for the period 2004 to 2009: the mean age of workers in industry *j* (*age*), the proportion of workers in industry *j* recorded as part-time (*ptr*), the proportion of female workers in industry *j* (*fem*) and the three regional employment variables (*midw, south* and *west*). Multi-factor productivity indices were taken from those published online by the US BLS. The following data were taken from on-line statistics published by the Bureau of Economic Analysis, US Department of Commerce: gross operating surplus per full-time equivalent (*pre*), proportionate change in industry turnover relative to the previous year (*qid*), export to sales ratios (*exs*) and import penetration (*imp*).

Data on annual wages were taken from the Occupational Employment Statistics (OES) database published by the US BLS. The OES is a micro-level database, based on a survey of 1.2 million establishments, that covers wages and employment for around 700 occupational categories and about 350 categories of industry, based on a sample of 1.2 million establishments. OES data are available from 1997 but changes in the classifications of both industries and occupations mean that a consistent time series is only available over much shorter periods. For this study a six-year period – 2004 to 2009 – is used.

As Lane *et al* (2007) note, this means that the survey, in effect, covers in excess of 34 million individuals. This greatly exceeds both the number of individuals as well as the level of detail of occupations and industries identified in the Current Population Survey (CPS). In this sense it provides substantially more micro-level detail despite being based on establishment level rather than individual responses. As Osburn (2000) notes this makes the OES database of particular use where a high level of detail by occupation and industry is of value, such as inter-industry wage comparisons. In particular, Osburn (2000, p 35) comments: 'Recent studies suggest that data by detailed occupation and industry implicitly control well for differences in demographic characteristics such as age, education, and experience.' That is, although the OES data lack data on individual characteristics such as experience there exists a body of research that suggest that the additional detail on occupation and industry can more than compensate for this deficiency.

Although the OES data have been much less widely used as a source of micro-

level data on wages and employment than the CPS data this partly reflects the more recent introduction of the OES database. Nonetheless, there is a reputable and growing literature in support of OES data in studies of a similar type to this. Abraham and Spletzer (2010) advance the case that occupational detail is an effective alternative to using age or education to capture underlying skills. They also provide a comparative analysis of OES and CPS data, finding that the CPS data tend to understate the returns to skills. Abraham and Spletzer (2010) use both OES and CPS data to analyse detailed changes in the structure of employment in the USA. Jones (2009) uses OES data to provide precise measurement of changes in wage equality. In conclusion, the OES database is a comparatively recent source of micro-level data, which has gained acceptance in the analysis of US wages and employment.

Details of the sample of tourism and tourism-associated industries are included in Appendix 1. These were intended to, as far as possible, match those industries included in the US TTSA published by the Bureau of Economic Analysis, US Department of Commerce. That is, all of the industries in the sample are also included in the TTSA – see, for example, Table M in Zemanek (2012). However, not all activities listed in the TTSA also appear in the sample. Industries producing personal consumption expenditures were excluded as not being either directly engaged or associated with tourism. The wholesale and retail sectors were also excluded from the sample due to problems of comparability with other sectors with respect to several industry variables. A few of the activities listed in the TTSA (toll roads, parking lots and garages) were also excluded due to missing data. Based on Zemanek (2012) these exclusions account for about 9% of direct employment in tourism industries.

Results for the sample of tourism and tourism-associated industries

The model specified by Equation (1) was estimated using three different points in the wage distribution for each industry-occupation cell – the mean, the 25th percentile and the 75th percentile. Cells (industry–occupation combinations) with no observed employment (or where employment is low as the observation is suppressed on confidentiality grounds) were excluded from the sample. To assess the contribution of different influences four versions of the model were estimated:

(i) as specified by Equation (1);
(ii) with fixed year effects (η_t) omitted;
(iii) with fixed occupational effects (θ_k) excluded;
(iv) with no fixed industry effects (δ_j).

Summary statistics on each specification are reported in Table 2.

In terms of formal statistical inference the *F*-tests for each of the three restricted models reject the hypothesis that the fixed effects are jointly zero for any reasonable confidence level. For the purposes of this paper this means, in particular, that a single, common model for all tourism and tourism-associated industries (with no significant industry effects) can only be justified with a statistically significant loss in the explanatory power of the model. However, reference to the residual sum of squares and Akaike information criteria (AIC)

Table 2. Comparison of different panel fixed effects specifications.

	Sum of squares			Akaike information criterion		
	Mean	25th percentile	75th percentile	Mean	25th percentile	75th percentile
Total sum of squares	3,207.844	2,756.912	3,563.499			
Residual sum of squares						
Three-way fixed effects	198.781	239.433	288.642	–21,648.1	–18,844.7	–16,028.7
Two-way fixed effects – no year effects	209.526	250.471	299.421	–20,865.0	–18,175.8	–15,486.3
Two-way fixed effects – no occupational effects	2,609.891	2,125.949	2,918.124	16,446.8	13,356.9	18,128.6
Two-way fixed effects – no industry effects	245.415	289.447	341.730	–18,541.0	–16,054.7	–13,553.1
***F*-test for linear restrictions**		***F*-statistics**		**Degrees of freedom**		
No year effects	132.165	112.711	91.308	(6,14670)		
No occupational effects	506.951	329.306	380.745	(351,14670)		
No industry effects	98.332	87.553	77.090	(35,14670)		

statistics reported in Table 2 show that the loss in the explanatory power of the model is far less if either fixed year effects of fixed industry effects are excluded than if fixed occupational effects are omitted. That is, excluding either industry effects or year effects, although not justifiable on grounds of statistical significance, still leaves a model with substantial explanatory power. Excluding occupational effects does not.

To avoid excessive detail the panel regression results are reported in full for two of the four specifications – the full model and the model with no industry fixed effects. Details of the other regressions are available from the author on request. The choice of the full model is a statistical one – the *F*-tests reported in Table 2 show all of the sets of restrictions tested to not be supported by the data. The choice of the model with no fixed industry effects is largely supported on economic grounds. A key objective of this paper is to try to establish 'representative' behaviour of tourism and tourism-associated activities in general. A single common specification for all tourism and tourism-associated industries is, therefore, of considerable interest. For this reason the specification with no fixed industry effects is included in Table 3 with the more general one.

Table 3 shows that, although the model which includes unobserved (fixed) industry effects is statistically superior, it is harder to interpret. Comparatively few of the coefficients are statistically significant at 90% or better. These are the regional variables for the Midwest, the proportionate change in turnover, export to sales ratios and the intercept term.

From the results presented in Table 2 the model with no fixed industry effects is statistically inferior but still with considerable explanatory power. Within the set of models estimated this is the most representative of a common relationship for all tourism and tourism-associated industries in the USA. The results suggest the following effects of industry characteristics on wages in tourism and tourism-associated activities:

- a positive and statistically significant effect of the mean age on wages;
- a statistically significant, positive effect of the proportion of part-time workers on wages, when evaluated at the mean and at the 75th percentile but not at the 25th percentile;
- negative and statistically significant effects of the share of employment of each region outside the North East on wages;
- a statistically significant positive effect of multi-factor productivity on industry wages;
- a positive and statistically significant effect of profits in the previous year on wages, partially offset by a negative and statistically significant effect of profits in the current period;
- a positive (statistically significant) effect of export to sales ratios on wages;
- no statistically significant effect of import penetration on either mean wages or at the 75th percentile.

These results support a number of the hypotheses put forward earlier with respect to the relationship between industry characteristics and wages. One key exception to this is that the results suggest a positive rather than a negative relationship between part-time working and wages. The model also finds a net rent sharing effect between profits and wages but with a somewhat complex

Table 3. Panel (fixed effect) regression results for the sample of tourism and tourism-associated industries.

Variable		Two-way fixed effects (no industry effects) using ln(wage) measured at			Three-way fixed effects using ln(wage) measured at		
Description	Label	Mean	25th percentile	75th percentile	Mean	25th percentile	75th percentile
Mean age of employees	age	0.0109908***	0.0102782***	0.0113279***	–0.00399	–0.00384	–0.00293
		(0.0008434)	(0.0009159)	(0.0009952)	(0.0033563)	(0.0036836)	(0.0040444)
Proportion of part time workers	ptr	0.1536604***	–0.01109	0.1945379***	0.00097	0.07121	–0.00159
		(0.0433341)	(0.0470613)	(0.0511353)	(0.0694696)	(0.076243)	(0.0837119)
Proportion of female workers	fem	–0.00018	–0.0002348*	–0.000302**	0.00015	0.00017	0.00012
		(0.0001123)	(0.0001219)	(0.0001325)	(0.0001661)	(0.0001823)	(0.0002001)
Proportion of employment in Midwest	midw	–0.4381986***	–0.01118	–0.4895871***	–0.3465246**	–0.4082064**	–0.3510937*
		(0.1211056)	(0.131522)	(0.1429075)	(0.1570022)	(0.1723101)	(0.1891901)
Proportion of employment in South	south	–0.6244936***	–0.4823169***	–0.6897359***	–0.10501	–0.03249	–0.13545
		(0.0911254)	(0.0989632)	(0.1075302)	(0.1111545)	(0.1219922)	(0.1339429)
Proportion of employment in West	west	–0.5431895***	–0.3564759***	–0.5402487***	–0.2047143*	–0.18089	–0.18370
		(0.080882)	(0.0878387)	(0.0954427)	(0.1219621)	(0.1338536)	(0.1469662)
Multi-factor productivity index	mfpi	0.0032211***	0.0029686***	0.0034638***	–0.00027	–0.00056	–0.00040
		(0.0001455)	(0.000158)	(0.0001717)	(0.0003272)	(0.0003591)	(0.0003943)
Gross operating surplus per full time equivalent	pre	–7.666497***	–9.17858***	–7.840358***	1.00375	0.92814	0.74659
		(0.6965465)	(0.756457)	(0.8219418)	(0.8286882)	(0.9094863)	(0.998582)
Gross operating surplus per full time equivalent (lagged one year)	pre1	8.413901***	9.469696***	8.715553***	1.31037	2.18451	0.50383
		(0.6940834)	(0.753782)	(0.8190352)	(1.174027)	(1.288496)	(1.414721)
Proportionate change in turnover (relative to previous year)	qid	0.2204349***	0.2904012***	0.202993***	0.1309587***	0.1492708***	0.1233001***
		(0.0374034)	(0.0406205)	(0.0441369)	(0.0389689)	(0.0427684)	(0.0469581)
Export to sales ratio	exs	0.5207213***	0.7706645***	0.489254***	–0.2992594***	–0.4196917***	–0.2564404**
		(0.0345158)	(0.0374845)	(0.0407294)	(0.1014014)	(0.1112882)	(0.1221903)

Table 3 continued.

Variable		Two-way fixed effects (no industry effects) using ln(wage) measured at			Three-way fixed effects using ln(wage) measured at		
Description	Label	Mean	25th percentile	75th percentile	Mean	25th percentile	75th percentile
Import penetration	imp	–0.1119318***	–0.2164923***	–0.06052	–0.06734	0.14966	–0.06557
		(0.04198)	(0.0455907)	(0.0495374)	(0.2181562)	(0.2394267)	(0.2628816)
Intercept	c	10.70381***	10.25752***	10.84032***	11.81734***	11.28037***	11.99513***
		(0.1260829)	(0.1369273)	(0.1487808)	(0.1929652)	(0.2117795)	(0.232526)
F-test		484.79	342.36	378.63	554.98	385.48	415.96
(Degrees of freedom)		F(366, 14699)	F(366, 14699)	F(366, 14699)	F(400, 14665)	F(400, 14665)	F(400, 14665)
R-squared		0.9235	0.895	0.9041	0.938	0.9132	0.919
Adj *R*-squared		0.9216	0.8924	0.9017	0.9363	0.9108	0.9168

Notes: Total observations: 15,066, comprising 6 years, 35 industries and 351 occupations, with gaps. Figures in parentheses are standard errors. ***Significant at 99%, **significant at 95% and *significant at 90%.

structure – with a substantial positive effect from the previous year's profits, partially offset by a substantial negative effect from current profits.

For the sample both the occupations and years were driven by data availability. The sample of tourism and tourism-associated industries, in contrast, needed to be chosen. It is recognized that there is considerable scope for disagreement with respect to an appropriate choice of sample – that other choices of sample with respect to industry could be argued to be well justified. The approach of this paper is to recognize that other choices could have been made and to conduct an informal analysis of the robustness of the estimates with respect to different possible choices of the sample of industries.

Table 4 presents estimates of the specified model of wage determination for mean wages only using three different samples. Sample 1 is the standard sample as previously reported. Sample 2 excludes those industries supporting those directly in providing services to tourists and sample 3 excludes both these supporting industries plus rail and water transportation. Precise details are provided in Appendix 1.

The results of the informal robustness analysis show that excluding supporting industries (sample 2) from the base sample makes comparatively little difference to most parameter estimates and almost no difference to the main conclusions for the three-way fixed effect model. Comparisons between sample 1 and sample 2 for the two-way fixed effects model involve larger changes in parameters for a few variables but no changes of substance in the main findings.

The effects of dropping both support industries and rail and water transportation (sample 3) does have more effect on both parameter estimates and on the resulting conclusions. These changes are again more marked for the two-way fixed effect model than the three-way fixed effect specification. Essentially the same conclusions are reached for both sample 1 and sample 3 in the two-way fixed effect model for the majority of variables, including age (positive and statistically significant), the Midwest and West regional variables (both negative and significant), multifactor productivity (positive and significant), lagged profit and change in turnover (both positive and statistically significant). However, there are also important behavioural differences between sample 1 and sample 3, affecting in particular the variables capturing the effects of female workers, exports and imports. Taken overall the three-way fixed effect estimator yields reasonably robust results across all three samples and the two-way fixed effect model across both sample 1 and sample 2. The two-way fixed effect model is only partially robust with respect to the choice between sample 1 and sample 3.

Results for the individual occupations

The analysis presented in this section seeks to establish whether or not industry wage premia or discounts exist for tourism and tourism-associated industries in the USA. In this sense a wage 'premium' or 'discount' is defined in a manner similar to unobservable differences in workers in wage studies based on individual data. It is the unobserved (fixed) industry effect remaining after the effects of observable industry characteristics have been taken into account. To estimate such effects requires a different sample to that used to estimate a

Table 4. Robustness of mean wage estimates with respect to sample selection.

		Three-way fixed effects – annual mean wage		
		Sample 1	Sample 2	Sample 3
Mean age of employees	age	–0.0039852	–0.0036111	–0.0055636
		(0.0033563)	(0.003326)	(0.0038558)
Proportion of part time workers	ptr	0.0009664	0.0523627	–0.0305076
		(0.0694696)	(0.0713632)	(0.0849719)
Proportion of female workers	fem	0.0001469	0.0001421	0.0002849*
		(0.0001661)	(0.0001638)	(0.0001717)
Proportion of employment in Midwest	midw	–0.3465246**	–0.3723718**	–0.2172049
		(0.1570022)	(0.1586558)	(0.1688059)
Proportion of employment in South	south	–0.1050114	–0.0855408	0.0189812
		(0.1111545)	(0.1137355)	(0.1291707)
Proportion of employment in West	west	–0.2047143*	–0.1933713	–0.1539905
		(0.1219621)	(0.1209546)	(0.1272555)
Multi-factor productivity index	mfpi	–0.0002679	–0.0002455	0.0008512
		(0.0003272)	(0.0003419)	(0.0006466)
Gross operating surplus per full time equivalent	pre	1.003748	0.9986371	0.826571
		(0.8286882)	(0.8194384)	(0.9234067)
Gross operating surplus per full time equivalent (lagged one year)	pre1	1.310367	1.568859	–1.628881
		(1.174027)	(1.183057)	(2.455533)
Proportionate change in turnover (relative to previous year)	qid	0.1309587***	0.111136***	0.1334346**
		(0.0389689)	(0.0394972)	(0.064376)
Export to sales ratio	exs	–0.2992594***	–0.318134***	–0.1737485
		(0.1014014)	(0.0997061)	(0.153531)
Import penetration	imp	–0.0673354	–0.1858685	–0.4108027
		(0.2181562)	(0.2218523)	(0.2828639)
Intercept	c	11.81734***	11.76529***	11.7762***
		(0.1929652)	(0.1910494)	(0.2154955)

R-squared =		0.938	0.943	0.941
Adj *R*-squared =		0.9363	0.9412	0.9391
F		554.98	542.75	506.18
Degrees of freedom		(400, 14665)	F(383, 12570)	F(360, 11435)
Number of observations		15066	12954	11796
Akaike information criterion		–21648.1	–19381.16	–17806.94
		Two-way fixed effects (no industry effects) – annual mean wage		
		Sample 1	**Sample 2**	**Sample 3**
Mean age of employees	age	0.0109908***	0.0101788***	0.0052493***
		(0.0008434)	(0.0008291)	(0.0008565)
Proportion of part time workers	ptr	0.1536604***	0.047706	–0.1185428**
		(0.0433341)	(0.0432619)	(0.0462382)
Proportion of female workers	fem	–0.0001794*	–0.0001652	0.0006499***
		(0.0001123)	(0.0001098)	(0.0001103)
Proportion of employment in Midwest	midw	–0.4381986***	–0.2490845**	–0.3547831***
		(0.1211056)	(0.1200976)	(0.1238835)
Proportion of employment in South	south	–0.6244936***	–0.6487139***	0.0358275
		(0.0911254)	(0.0926443)	(0.0929528)
Proportion of employment in West	west	–0.5431895***	–0.4982956***	–0.3882369***
		(0.080882)	(0.0801866)	(0.0793846)
Multi-factor productivity index	mfpi	0.0032211***	0.0036004***	0.002084***
		(0.0001455)	(0.0001559)	(0.0001845)
Gross operating surplus per full time equivalent	pre	–7.666497***	–6.873894***	0.3890377
		(0.6965465)	(0.6791749)	(0.7228648)
Gross operating surplus per full time equivalent (lagged one year)	pre1	8.413901***	7.555813***	2.00183***
		(0.6940834)	(0.6776041)	(0.7136002)
Proportionate change in turnover (relative to previous year)	qid	0.2204349***	0.2298358***	0.2896891***
		(0.0374034)	(0.0374127)	(0.0481946)

Table 4 continued.

		Two-way fixed effects (no industry effects) – annual mean wage		
		Sample 1	Sample 2	Sample 3
Export to sales ratio	exs	0.5207213***	0.5431925***	–0.7735774***
		(0.0345158)	(0.0341002)	(0.0650396)
Import penetration	imp	–0.1119318**	–0.2269192***	1.325811***
		(0.04198)	(0.0439054)	(0.0729123)
Intercept	c	10.70381***	10.76702***	11.03704***
		(0.1260829)	(0.1260183)	(0.1281624)
R-squared =		0.9235	0.9307	0.9346
Adj *R*-squared =		0.9216	0.9287	0.9327
F		484.79	476.25	488.97
Degrees of freedom		F(366, 14699)	F(355, 12598)	F(335, 11460)
Number of observations		15066	12954	11796
Akaike information criterion		–18540.96	–16902.19	–16654

representative relationship for the tourism and tourism-associated sector. To identify differences from other industries it requires a sample drawn from all industries rather than just tourism and tourism-associated ones.

An important reason for using the OES data was that it allows very specific occupational categories to be identified. This helps to reduce the risk that inter-industry comparisons are really picking up wage differences between occupations rather than industries. For example, wage comparisons between a broad occupational category such as 'professionals' between, say, health services and education, is as likely to capture differences in earnings between doctors and teachers as between the two industries. However, simply using more detailed occupational categories is not sufficient to resolve all such difficulties. A further complication is that doctors are not typically employed in education and teachers not in health services. When occupations are specific to one or a few industries it will be inherently very difficult to separate 'industry' effects on average wages from differences between one occupation and another.

To overcome these difficulties the relationship between industry characteristics and wages was estimated at the level of an individual occupation for five specific occupations. Those occupations that are employed in more than trivial numbers in a large number of different industries are surprisingly few. The following occupations were selected as being employed in more than one half of the 351 industries in the dataset:

- accountants and auditors;
- administrative services managers;
- payroll clerks;
- receptionist;
- janitors and cleaners.

For each occupation the relationship specified in Equation (1) was estimated, with the exception that no fixed occupation effects were estimated since the data were for a single occupation. Note that industries for which there was no recorded employment for the particular occupation were excluded from the sample. This means that the sample and sample size differs between each occupation. The results are presented in Table 5. The estimated industry fixed effects are reported for tourism and tourism-associated industries only. Blanks appear in the table for those tourism and tourism-associated industries for which there was no recoded employment of the particular occupation.

For accountants and auditors industry fixed effects are statistically significant for mean wages at 90% confidence or better for the great majority of tourism and tourism-associated industries (20 out of 26 industries). For the 25th and 75th percentiles industry fixed effects are also similarly significant in a majority of cases. Where the coefficients for accountants and auditors are statistically significant they are almost universally negative. That is, the results suggest an industry wage discount in most tourism and tourism-associated industries for accountants and auditors. After taking into account the industry characteristics specified by the model there is, typically, a statistically significant and negative effect on the wages of accountants and auditors in these industries.

The results for administrative services managers are comparable to those for accountants and auditors when wages are measured at the mean and at the 25th

Table 5. Panel regression results for individual occupations.

NAICS/ label	NAICS title/variable description	Accountants and auditors					
		Mean		25th percentile		75th percentile	
		Coefficent	SE	Coefficent	SE	Coefficent	SE
(A) Industry fixed effects for sample of tourism and tourism-associated industries							
481100	Scheduled air transportation	–0.0732***	0.035461	0.0433248	0.033489	–0.0388332	0.039395
481200	Non-scheduled air transportation	–0.0505332	0.035461	0.0263246	0.033489	–0.0459997	0.039395
482100	Rail transportation	0.067259	0.041422	0.17625***	0.039118	0.09631**	0.046018
483100	Sea, coastal, and great lakes water transportation	0.0107151	0.040018	–0.0129968	0.037792	0.0453473	0.044458
483200	Inland water transportation	–0.0036183	0.040018	0.0278368	0.037792	0.0480141	0.044458
485300	Taxi and limousine service	–0.0521783	0.036296	0.008451	0.034278	0.0090924	0.040323
485500	Charter bus industry	–0.12421***	0.038185	–0.07878**	0.036061	–0.0493299	0.042421
485900	Other transit and ground passenger transportation	–0.13838***	0.038185	–0.06095*	0.036061	–0.11050***	0.042421
487100	Scenic and sightseeing transportation, land						
487200	Scenic and sightseeing transportation, water	–0.27195***	0.038254	–0.13417***	0.036126	–0.23017***	0.042498
488100	Support activities for air transportation	–0.12295***	0.038403	–0.0705*	0.036268	–0.07584*	0.042664
488200	Support activities for rail transportation	–0.24145***	0.038403	–0.14966***	0.036268	–0.22101***	0.042664
488300	Support activities for water transportation	–0.13428***	0.038403	–0.06120*	0.036268	–0.10701**	0.042664
488400	Support activities for road transportation	–0.14128***	0.038403	–0.14416***	0.036268	–0.16085***	0.042664
488900	Other support activities for transportation	–0.16161***	0.038403	–0.12483***	0.036268	–0.13351***	0.042664
532100	Automotive equipment rental and leasing	0.1208642	0.073572	0.0325139	0.06948	0.1165882	0.081735
561500	Travel arrangement and reservation services	–0.16981***	0.041788	–0.10719***	0.039464	–0.13154***	0.046424
711100	Performing arts companies	0.0341206	0.038821	0.0079191	0.036662	0.08827**	0.043128
711200	Spectator sports	–0.0477126	0.038821	–0.0294142	0.036662	0.0076026	0.043128
711300	Promoters of performing arts, sports, and similar events	–0.08221**	0.038821	–0.009581	0.036662	–0.034231	0.043128
711400	Agents and managers for artists, athletes etc	0.0587874	0.038821	0.08959**	0.036662	0.10327**	0.043128
711500	Independent artists, writers, and performers						

712100	Museums, historical sites, and similar institutions	–0.08455**	0.039024	–0.0388162	0.036854	–0.0525113	0.043354
713100	Amusement parks and arcades						
713200	Gambling industries	–0.33383***	0.038415	–0.36081***	0.036279	–0.24861***	0.042678
713900	Other amusement and recreation industries	–0.13417***	0.038415	–0.06231*	0.036279	–0.07361*	0.042678
721100	Traveller accommodation	–0.27972***	0.037798	–0.25083***	0.035696	–0.20109***	0.041992
721200	Recreational vehicle parks and recreational camps	–0.23012***	0.03671	–0.18926***	0.034668	–0.16986***	0.040783
721300	Rooming and boarding houses						
722100	Full-service restaurants	–0.25010***	0.051713	–0.20079***	0.048837	–0.1392**	0.057451
722200	Limited-service eating places	–0.13560**	0.051713	–0.0741212	0.048837	–0.0151536	0.057451
722300	Special food services	–0.19477***	0.051713	–0.0696212	0.048837	–0.10815*	0.057451
722400	Drinking places (alcoholic beverages)	–0.15170***	0.051961	–0.13443***	0.049072	–0.0761248	0.057727
811100	Automotive repair and maintenance	–0.08610**	0.035291	–0.0352118	0.033328	–0.0632349	0.039206
(B) Independent variables							
age	Mean age of employees	0.0022361	0.002218	0.0026112	0.002095	0.00489**	0.002464
ptr	Proportion of part time workers	–0.0385413	0.157901	–0.1161105	0.14912	–0.1369813	0.175421
fem	Proportion of female workers	–0.000366	0.000329	–0.000147	0.00031	–0.0002145	0.000365
midw	Proportion of employment in Midwest	0.0224172	0.089431	–0.0700605	0.084457	–0.0045949	0.099354
south	Proportion of employment in South	–0.0149322	0.072746	–0.1102044	0.0687	–0.0500015	0.080818
west	Proportion of employment in West	–0.14111*	0.081789	–0.16901**	0.077241	–0.1234834	0.090864
mfpi	Multi factor productivity index	0.0000158	0.000117	0.0001048	0.000111	0.0000311	0.00013
pre	Gross operating surplus per full-time equivalent	–1.0006**	0.466893	–0.6847161	0.440927	–1.0327**	0.518696
pre1	Gross operating surplus per full-time equivalent (lagged one year)	–0.1820297	0.506863	0.3604537	0.478674	0.0799601	0.563101
qid	Proportionate change in turnover from previous year	0.0414**	0.019981	0.0288448	0.01887	0.0263559	0.022198
exs	Export to sales ratio	–0.0210823	0.090561	–0.0308357	0.085524	0.0844326	0.100609
imp	Import penetration	–0.23623***	0.087978	–0.2690***	0.083086	–0.25192***	0.09774
c	Intercept	10.975***	0.216662	10.717***	0.204612	11.089***	0.240701

Table 5 continued.

NAICS/ label	NAICS title/variable description	Accountants and auditors		
		Mean	25th percentile	75th percentile
	F-test	13.94	13.71	14.43
	(Degrees of freedom)	F(284, 1353)	F(284, 1353)	F(284, 1353)
	R-squared	0.7453	0.7421	0.7518
	Adj *R*-squared	0.6919	0.688	0.6997
	Number of observations	1,638	1,638	1,638

		Payroll clerks					
		Mean		25th percentile		75th percentile	
		Coefficent	SE	Coefficent	SE	Coefficent	SE
(A) Industry fixed effects for sample of tourism and tourism associated industries							
481100	Scheduled air transportation	0.24858***	0.036019	0.34243***	0.055457	0.17804***	0.03718
481200	Non-scheduled air transportation	0.27141***	0.036019	0.35177***	0.055457	0.20337***	0.03718
482100	Rail transportation	0.46344***	0.042521	0.61550***	0.065468	0.34884***	0.043892
483100	Sea, coastal, and great lakes water transportation	0.3106***	0.040168	0.38371***	0.061846	0.24061***	0.041464
483200	Inland water transportation						
485300	Taxi and limousine service	0.17065***	0.036752	0.19658***	0.056586	0.15382***	0.037937
485500	Charter bus industry	0.2112***	0.038455	0.29805***	0.059209	0.14332***	0.039695
485900	Other transit and ground passenger transportation	0.1417***	0.038455	0.18322***	0.059209	0.10432***	0.039695
487100	Scenic and sightseeing transportation, land						
487200	Scenic and sightseeing transportation, water						
488100	Support activities for air transportation	0.18633***	0.038896	0.28039***	0.059887	0.1233***	0.04015
488200	Support activities for rail transportation						
488300	Support activities for water transportation	0.34050***	0.038896	0.34906***	0.059887	0.2903***	0.04015
488400	Support activities for road transportation	0.12500***	0.038896	0.18473***	0.059887	0.10529***	0.04015
488900	Other support activities for transportation						
532100	Automotive equipment rental and leasing	0.21334***	0.074167	0.26234**	0.114193	0.1242901	0.076559
561500	Travel arrangement and reservation services	0.19453***	0.041795	0.23237***	0.064351	0.14869***	0.043143

711100	Performing arts companies	0.33500***	0.038917	0.46429***	0.059919	0.25962***	0.040172
711200	Spectator sports						
711300	Promoters of performing arts, sports, and similar events						
711400	Agents and managers for artists, athletes etc						
711500	Independent artists, writers, and performers						
712100	Museums, historical sites, and similar institutions	0.29028***	0.0391	0.355423***	0.060202	0.23245***	0.040361
713100	Amusement parks and arcades	0.14485***	0.038673	0.24268***	0.059544	0.08965**	0.03992
713200	Gambling industries	0.18218***	0.038673	0.21468***	0.059544	0.13948***	0.03992
713900	Other amusement and recreation industries	0.17252***	0.038673	0.20385***	0.059544	0.13115***	0.03992
721100	Traveller accommodation	0.15293***	0.03765	0.22822***	0.057968	0.09699**	0.038864
721200	Recreational vehicle parks and recreational camps	0.0501338	0.03666	0.0615065	0.056444	0.0483282	0.037842
721300	Rooming and boarding houses						
722100	Full-service restaurants	0.06263	0.052587	0.0376798	0.080966	0.0540619	0.054282
722200	Limited-service eating places	0.0702966	0.052587	0.1041796	0.080966	0.0398955	0.054282
722300	Special food services	0.19446***	0.052587	0.23751***	0.080966	0.15489***	0.054282
722400	Drinking places (alcoholic beverages)	–0.0351591	0.05281	-0.0909024	0.08131	-0.0762709	0.054513
811100	Automotive repair and maintenance	0.1170***	0.03563	0.11395**	0.054858	0.11541***	0.036779
(B) Independent Variables							
age	Mean age of employees	–0.0004197	0.00228	-0.0005715	0.003511	-0.0020965	0.002354
ptr	Proportion of part time workers	–0.240265	0.165544	-0.2460631	0.254884	-0.2919*	0.170883
fem	Proportion of female workers	0.0001172	0.000312	0.0005738	0.00048	-1.53E-07	0.000322
midw	Proportion of employment in Midwest	0.0070342	0.091339	0.1058162	0.140632	-0.0321732	0.094284
south	Proportion of employment in South	–0.0152921	0.076599	0.0655261	0.117938	-0.0878092	0.079069
west	Proportion of employment in West	0.0524479	0.084475	0.1088407	0.130064	-0.0034018	0.087199
mfpi	Multi factor productivity index	0.0001179	0.000119	0.0001825	0.000183	0.0000139	0.000123
pre	Gross operating surplus per full-time equivalent	–1.1615**	0.476474	–1.107247	0.733614	-0.85261*	0.491839
pre1	Gross operating surplus per full-time equivalent (lagged one year)	1.5512***	0.514418	1.6732**	0.792035	1.4077***	0.531006

Table 5 continued.

NAICS/ label	NAICS title/variable description	Payrolls clerks					
		Mean		25th percentile		75th percentile	
qid	Proportionate change in turnover from previous year	0.0085443	0.022485	0.0214984	0.034619	-0.0161769	0.02321
exs	Export to sales ratio	–0.1084448	0.092354	-0.0534219	0.142194	-0.1032678	0.095332
imp	Import penetration	–0.0829105	0.091457	-0.2032271	0.140814	-0.0300644	0.094407
c	Intercept	10.376***	0.225585	9.9987***	0.347327	10.782***	0.232859
	F-test	17.64		14.92		15.75	
	(Degrees of freedom)	F(262, 1243)		F(262, 1243)		F(262, 1243)	
	R-squared	0.788		0.7587		0.7685	
	Adj *R*-squared	0.7433		0.7079		0.7197	
	Number of observations	1,506		1,506		1,506	
		Juniors and cleaners					
		Mean		25th percentile		75th percentile	
		Coefficent	SE	Coefficent	SE	Coefficent	SE
(A) Industry fixed effects for sample of tourism and tourism associated industries							
481100	Scheduled air transportation	0.37331***	0.035489	0.28990***	0.03815	0.47752***	0.047051
481200	Non-scheduled air transportation	0.29965***	0.035489	0.24923***	0.03815	0.36402***	0.047051
482100	Rail transportation						
483100	Sea, coastal, and great lakes water transportation						
483200	Inland water transportation						
485300	Taxi and limousine service	0.0371985	0.036094	0.07041*	0.0388	0.045233	0.047853
485500	Charter bus industry	0.0071135	0.038032	0.0104147	0.040883	0.0096226	0.050422
485900	Other transit and ground passenger transportation	0.09094**	0.038032	0.0455814	0.040883	0.15145***	0.050422
487100	Scenic and sightseeing transportation, land	0.0325016	0.038144	0.09024**	0.041004	0.0608836	0.05057

487200	Scenic and sightseeing transportation, water	0.08033**	0.038144	0.0595785	0.041004	0.10638**
488100	Support activities for air transportation	0.11645***	0.038298	0.1374***	0.04117	0.11864**
488200	Support activities for rail transportation	0.21562***	0.038298	0.19958***	0.04117	0.19614***
488300	Support activities for water transportation					
488400	Support activities for road transportation	0.06962*	0.038298	0.0374151	0.04117	0.14830***
488900	Other support activities for transportation	0.0356211	0.038298	0.0477483	0.04117	0.0813067
532100	Automotive equipment rental and leasing	0.1665**	0.074269	0.15956**	0.079838	0.1303733
561500	Travel arrangement and reservation services	0.06972*	0.041945	0.08908**	0.04509	0.090014
711100	Performing arts companies	0.16270***	0.038659	0.14141***	0.041558	0.19434***
711200	Spectator sports	0.10620***	0.038659	0.10758***	0.041558	0.12484**
711300	Promoters of performing arts, sports, and similar events	0.17987***	0.038659	0.14675***	0.041558	0.25134***
711400	Agents and managers for artists, athletes etc					
711500	Independent artists, writers, and performers	0.2304***	0.038659	0.09424**	0.041558	0.31151***
712100	Museums, historical sites, and similar institutions	0.11235***	0.038863	0.13676***	0.041777	0.13319***
713100	Amusement parks and arcades					
713200	Gambling industries	0.0604811	0.038248	0.11695***	0.041116	0.09552*
713900	Other amusement and recreation industries	0.0396476	0.038248	0.08812**	0.041116	0.0695283
721100	Traveller accommodation	0.13802***	0.037876	0.13266***	0.040716	0.22175***
721200	Recreational vehicle parks and recreational camps	–0.051292	0.036781	0.0128602	0.039539	–0.0342541
721300	Rooming and boarding houses	0.08554**	0.036781	0.0570268	0.039539	0.1432***
722100	Full-service restaurants	0.0499138	0.051143	0.11464**	0.054978	0.0876036
722200	Limited-service eating places	–0.0239197	0.051143	0.0581403	0.054978	–0.0052296
722300	Special food services	0.077247	0.051143	0.13081**	0.054978	0.11410*
722400	Drinking places (alcoholic beverages)	–0.0221969	0.051396	0.0409163	0.05525	0.0243301
811100	Automotive repair and maintenance	–0.007038	0.035254	0.0196251	0.037897	0.0303262
(B) Independent Variables						
age	Mean age of employees	0.0040778	0.002219	0.00498**	0.002385	0.0045103
ptr	Proportion of part time workers	–0.1039882	0.143797	–0.2055332	0.154579	–0.1080377
fem	Proportion of female workers	0.0003828	0.000329	0.000361	0.000354	0.0001784

Table 5 continued.

NAICS/ label	NAICS title/variable description	Juniors and cleaners					
		Mean		25th percentile		75th percentile	
midw	Proportion of employment in Midwest	0.0674521	0.090638	0.1572499	0.097434	0.0105807	0.120166
south	Proportion of employment in South	0.16031**	0.07501	0.17649**	0.080634	0.18336*	0.099447
west	Proportion of employment in West	–0.0033914	0.082709	0.0006197	0.088911	–0.0464674	0.109654
mfpi	Multi factor productivity index	–0.0001167	0.000119	0.000132	0.000127	–0.0001031	0.000157
pre	Gross operating surplus per full-time equivalent	–0.4522153	0.472806	0.0059019	0.508258	–0.1898467	0.626837
pre1	Gross operating surplus per full-time equivalent (lagged one year)	0.2652481	0.515109	0.0756568	0.553733	0.5728161	0.682921
qid	Proportionate change in turnover from previous year	0.0457**	0.021421	0.0356077	0.023028	0.0395932	0.0284
exs	Export to sales ratio	–0.32220***	0.092785	–0.33395***	0.099743	–0.34883***	0.123013
imp	Import penetration	0.0372783	0.089569	–0.0025218	0.096285	0.1909658	0.118749
c	Intercept	9.6964***	0.202976	9.4704***	0.218196	9.8033***	0.269102
	F-test	29.69		22.52		29.17	
	(Degrees of freedom)	F(273, 1298)		F(273, 1298)		F(273, 1298)	
	R-squared	0.862		0.8257		0.8598	
	Adj *R*-squared	0.833		0.789		0.8304	
	Number of observations	1,572		1,572		1,572	

Note: ***Significant at 99%, **significant at 95%, *significant at 90%.

percentile for the relevant industry–occupation combinations. For mean wages industry effects for tourism and tourism-associated activities are statistically significant in 15 out of 22 cases and statistically significant in all 22 cases at the 25th percentile. For the wages of administrative services managers, measured at the mean and 25th percentile, these coefficients are universally negative, again suggesting a wage discount for tourism and tourism-associated industries. This pattern is not, however, repeated for wages measured at the 75th percentile. None of the fixed effects for tourism and tourism-associated industries are statistically significant when wages are measured at the 75th percentile. This suggests that, for administrative services managers, there is also a wage discount for tourism and tourism-associated activities but that this does not apply at the higher end of the wage distribution.

Industry effects for the wages of payroll clerks are statistically significant at 90% or better for almost all of the relevant tourism and tourism-associated activities when measured at the mean and 25th and 75th percentiles. Where these effects are statistically significant they are universally positive. That is, the results for payroll clerks suggest tourism and tourism-associated industry wage premia. For receptionists the results are comparable. Industry fixed effects are statistically significant for almost all the tourism and tourism-associated activities covered and, where they are statistically significant, they are positive. Again this applies at the mean, 25th percentile and 75th percentile.

For the last occupational category covered – janitors and cleaners – tourism and tourism-associated industry fixed effects are statistically significant in a majority but far from all cases (16 out of 27 for mean wages). As with payroll clerks and receptionists where these effects are statistically significant they are positive. Although for janitors and cleaners it is less close to being a universal result the results do again suggest an industry wage premium for tourism and tourism-associated activities.

The results of this analysis suggest that an industry wage discount or premium for tourism and tourism-associated industries in the USA is meaningful. The analysis tries to minimize inherent difficulties in defining industry rather than occupational wage differences by taking data for individual, precisely defined occupations. It then uses a series of industry characteristics to explain these differences. The resulting industry fixed effects then pick up the influences of unobserved and unobservable industry characteristics – industry wage premia and discounts. It is difficult to draw systematic conclusions from a small number of occupations. The small number is not a matter of choice. There simply are not many occupations that are employed in a wide range of different industries. For the occupations that could be so identified the results suggest a tourism and tourism-associated discount for more highly paid occupations (accountants and administrative services managers) and a tourism and tourism-associated premium for more lowly paid occupations (payroll clerks, receptionists, janitors and cleaners).

Conclusion

Policy implications

The representation of tourism and associated industries as low skill and low wage activities is too much of a generalization to be useful for policy purposes.

Although many do, some of the relevant industries (Table 1) do not exhibit low industry average wages at all. In the growing literature on 'good jobs' these industries cannot universally be dismissed as providing only 'bad' jobs.

In the USA the issue of growing wage inequality has been well documented. Growing employment and wages for highly skilled workers does not suggest that a lack of growth in 'good' jobs is a particular problem. However, it is very unlikely that the workforce will ever be without workers lacking in significant skills. Since these seem to be the losers from the steady increase in wage inequality there is a case for making 'bad' jobs better. The research presented here suggests that, for a small selection of low skill occupations, tourism and tourism-associated industries offer an industry wage premium. That is, that they offer better opportunities for these occupations than the rest of the economy.

Research implications

The evidence for the USA is both familiar and clear – tourism and tourism-associated industries, on balance, pay markedly lower wages than other sectors of the economy. This is not a universal tendency. Some tourism and tourism-associated industries, mainly in transportation, exhibit higher than average industry wages. The majority of tourism and tourism-associated industries, particularly those in hospitality, do not.

For tourism and tourism-associated industries in the USA, most of the variation in wages by industry can be explained by industry characteristics and by differences in wages between one occupation and another. The findings of this paper emphasize the importance of differences in occupational wages in understanding industry wages in tourism and tourism-associated activities. These results also support the findings of earlier research by other authors that the use of detailed occupational data is an effective alternative to other, more widely used ways of capturing underlying skill differences. A number of industry characteristics are also important in understanding wages in tourism and tourism-associated industries. These include regional differences, the mean age of workers, export intensity, profitability and rent-sharing, multi-factor productivity and demand growth.

Although the results presented in this paper show that it is possible to explain much of the variation in wages in US tourism and tourism-associated industries, the concept of an industry wage premium or discount still remains a valid representation of unobserved and unobservable sources of differences in wages between tourism and tourism-associated activities and other industries. To identify such industry wage premia has a number of complexities. First, it requires the sample to be extended to include other industries. Second, it requires careful selection of the occupations involved because many occupations are specific to one or very few industries. The results for a small number of occupations, specifically selected for being employed in a large number of industries, are interesting. Estimates for (i) accountants and auditors and (ii) administrative services managers suggest a statistically significant wage discount for tourism and tourism-associated industries. Estimates for three more lowly paid occupations – payroll clerks, receptionists and janitors and cleaners – suggest the reverse. That is, for the small number of occupations considered and after taking observed industry characteristics into account, the lower paid

occupations benefit from an industry wage premium but the higher paid occupations face a discount.

In this study industry wage premia were estimated only for a small number of occupations and future research could usefully extend this analysis to a wider sample. 'Tourism' is complicated to measure and it is particularly difficult to match information on tourism 'output' with data on potential wage determinants. As a result there is no single correct methodology or correct sample to address these issues. Further research using different samples and different approaches is needed.

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Appendix 1

Table A. Sample of tourism and tourism-associated industries.

NAICS	Description	Sample 2	Sample 3
4811	Scheduled air transportation		
4812	Non-scheduled air transportation		
4821	Rail transportation		excluded
4831	Sea, coastal, and great lakes water transportation		excluded
4832	Inland water transportation		excluded
4852	Taxi and limousine service		
4853	Charter bus industry		
4855	Other transit and ground passenger transportation		
4859	Scenic and sightseeing transportation, land		
4871	Scenic and sightseeing transportation, water		
4872	Support activities for air transportation		
4879	Support activities for rail transportation		
4881	Support activities for water transportation	excluded	excluded
4882	Support activities for road transportation	excluded	excluded
4883	Other support activities for transportation	excluded	excluded
4884	Automotive equipment rental and leasing	excluded	excluded
5321	Travel arrangement and reservation services		
5615	Performing arts companies		
7111	Spectator sports		
7112	Promoters of performing arts, sports, and similar events		
7113	Agents and managers for artists, athletes etc		
7114	Independent artists, writers, and performers	excluded	excluded
7115	Museums, historical sites, and similar institutions	excluded	excluded
7121	Amusement parks and arcades		
7131	Gambling industries		
7132	Other amusement and recreation industries		
7139	Traveller accommodation		
7211	Recreational vehicle parks and recreational camps		
7212	Rooming and boarding houses		
7213	Full-service restaurants		
7221	Limited-service eating places		
7222	Special food services		
7223	Drinking places (alcoholic beverages)		
7224	Automotive repair and maintenance		
8111	Scheduled air transportation		