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‘Restaurant Wars’: Spatial Competition in UK Restaurants

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ABSTRACT

This paper investigates spatial competition and the price-quality relationship in the UK gourmet restaurant sector using a comprehensive panel data set compiled from the UK Good Food Guide. A positive relationship between meal prices and restaurant quality as assessed by the Guide is identified. Moreover, restaurants appear to raise prices when the number of restaurants in close proximity that offer similar cuisine increases. Yet restaurants are found to reduce prices in line with standard competitive market responses when there are a greater number of similar restaurants placed further apart.

KEYWORDS

spatial competition, price competition, restaurant industry

JEL CLASSIFICATIONS

D22, D43, L1

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1. INTRODUCTION

'*One cannot think well, love well, sleep well, if one has not dined well.'*

Virginia Woolf

Across the UK it seems that the nation's appetite for good food is insatiable. This is seen in the increasing number of high profile chefs, cook books, and television programmes, as well as restaurants celebrating an increasingly diverse and eclectic range of cuisines. According to Keynote (www.keynote.co.uk) there were 27,915 restaurants across the UK in 2010, in which customers spent an estimated £6.405 billion on food alone.[1] Meanwhile Eatout Magazine (www.eatoutmagazine.co.uk) reports that an increasing number of people are eating out and they are becoming more sophisticated in their choices, making for a very dynamic and buoyant market, with increased product choice and variety as consumers are attracted to niche areas of the restaurant sector. If the UK continues to follow US trends (where more than 50% of expenditure on food is on food consumed outside of the home, compared with only 25-30% in the UK) the potential for growth of the non-fast food and non-chain restaurant sectors is promising. Hence, the objective of this paper is to examine the effects of spatial competition on prices of meals in high quality UK restaurants, using a unique panel data set gathered from 'The Good Food Guide' denoted by GFG below.

Guides such as The Good Food Guide continue to be important as a restaurant meal is necessarily an experience good as described by Nelson (1970). Consumers can use information from restaurant guides and reviews either to help them select a restaurant when visiting an unfamiliar locality or to supplement local knowledge of restaurants in their neighbourhoods. If a consumer enjoys a meal in a good restaurant then there is a high probability that they will return so initial impressions are backed up by habit persistence. The initial restaurant visit could well be motivated, at least in part, by an entry in the Good Food

[1] These figures only consider restaurants in the traditional sense, not fast-food restaurants nor pubs serving food.

Guide, which does tend to be advertised by successful restaurants. Indeed, most high quality restaurants strive to be in the Good Food Guide and inclusion is taken within the industry to be a laudatory commendation. Hence, entries in the Good Food Guide can be taken to be a good proxy for restaurant quality.

Results of the empirical analysis provide insights into a variety of interrelated subjects addressed in the Industrial Organisation literature. Restaurants are characterised by multiple facets of horizontal product differentiation, with establishments not only horizontally differentiated in terms of their geographic location, but also the facilities and cuisine offered which will not be equivalently ranked by all customers or reviewers. Demand for particular restaurants is then seemingly complicated by changing views as to what is fashionable. Restaurants must also choose the quality of their offerings, and as such restaurants will be vertically differentiated.[2] The interplay between aspects of horizontal and vertical differentiation and price will be explored, with particular attention paid to the nature of competition between restaurants in a locality, considering the impact on meal price of the number of competing restaurants, both those offering comparable and those offering more diverse cuisines. Further, the context for this analysis is a unique dataset, in terms of both scale but also diversity of restaurants compared to studies previously produced. The data set includes variables indicating the physical location of a restaurant, prices, GFG quality indicator, seating capacity, cuisine type, and other restaurant characteristics for all restaurants in the GFG.

The paper is structured in the following way. In the next section the relevant literature is described, Section 3 discusses the data, Section 4 provides the empirical analysis, and finally conclusions are offered in Section 5.

[2] It is recognised that while all consumers are assumed to prefer high quality to low quality, subject to income constraints, a complicating factor is that all consumers may not agree what constitutes a higher quality restaurant meal. This problem is not considered in the analysis below.

2. LITERATURE REVIEW

The majority of studies of restaurant pricing apply hedonic pricing methods. Wider applications of hedonic pricing methods are diverse, for example, encompassing the pricing of wine (Combris et al. 1997, Benfratello et al. 2009, Roma et al. 2013), cigars (Freccia et al. 2003), and violins (Graddy and Margolis 2011) as well as more standard applications such as to property prices (see Kiel and Zabel 2008, Ahlfeldt and Maennig 2013 for recent hedonic house pricing examples). Considering the restaurant industry Falvey et al. (1992) examined the average prices paid in New Orleans for a set menu as well as for selected main courses. They found 'service', 'ambience' and 'French Quarter' to influence meal prices. Interestingly, they concluded that quality does not affect prices. Gunawardana and Havrila (1996) examined the average price of a three course meal and average price of main courses in Melbourne restaurants. Like Falvey et al, they did not find a significant role for media/industry ratings in either measure of meal price. Ehrmann et al. (2009), using a cross-section of 256 restaurants, have examined the impact of Michelin stars and GaultMillau scores, as well as the number of quality competing restaurants nearby on price in Germany. In contrast to the earlier results, they show that cuisine scores and having a celebrity chef attached to a restaurant each positively affects meal prices.

Kalnins (2003) examined the factors that determine 'burger' prices, controlling for number of competing 'burger establishments' and the impact of rival franchise prices in the vicinity. The most recent contribution to the literature is by Fogarty (2012) who examined Australian meal prices as a function of restaurant quality as scored in influential restaurant guides, cuisine type and restaurant characteristics. As with Ehrmann et al, Fogarty finds a significant positive effect of restaurant guide scores on meal prices.

Apart from Kalnins (2003), none of the above-cited papers examine in any detail the effect of spatial competition on restaurants. However, the study by Kalnins examines the

fast-food sector serving a fairly homogeneous product in a local area, and the data set covers a sub-sample of establishments. In contrast, the analysis below incorporates all high-quality restaurants in the UK accredited by the Good Food Guide. The upscale restaurant sector is occupied by different cuisine types and account is taken of this heterogeneity in the analysis. Specifically, the research distinguishes between similar restaurants serving meals of the same cuisine type, which can be considered as close substitutes, and competing restaurants of dissimilar cuisine type which nevertheless offer substitute options for potential diners. The empirical analysis is based on a large panel dataset of over 8,550 restaurant-year observations featuring 2,998 unique establishments. It is believed that this is the largest dataset analysed to date for the non-fast food restaurant sector. As mentioned earlier, it is the full population of all restaurants included in the UK Good Food Guide, generally regarded within the industry as the premier guide for potential diners having been established in 1951 and having maintained a strong reputation since that time.

In other studies, Becker (1991), Banerjee (1992) and Albrecht et al. (2002) have examined why restaurants might choose not to increase prices, even in the presence of excess demand for covers, while Anderson and Magruder (2012) look at the impact of online customer reviews on restaurant reservation availability. Berry and Waldfogel (2010) use the US restaurant (and newspaper) industry to test the relationship between market size and market concentration. Fleck and Hanssen (2008) examine the relationship between the imposition of smoking bans and sales in restaurants. Chossat and Gergaud (2003) examine factors impacting GaultMillau guide scores given to French restaurants, concluding that these summary quality scores depend both on the quality of the cuisine, but also the restaurant's setting. In a later analysis, Gergaud et al. (2007) studied factors explaining the Michelin Guide score of a restaurant and prices.[3]

[3] Note that Combris et al. (1997) similarly model both price and quality in their study of Bordeaux wine.

There are large theoretical and empirical literatures exploring the interplay between combinations of price, entry and competition, dimensions of horizontal differentiation including spatial differentiation, and vertical differentiation variables. Bresnahan and Reiss (1991) examine the effects of entry in concentrated markets. They analyse five retail and professional industries and show that all variation in competitive conduct occurs with the entry of the second or third firm. Once the market has three to five incumbents, the next entrant has little effect on competitive conduct. Pal and Sarkar (2002) note that price competition cannot lead to a clustering effect, as clustering firms severely intensifies competition and drives profits to zero. However, they argue that is feasible under spatial Cournot competition where geographically closely located competing firms can earn positive profits. Therefore, compared to the results obtained with price competition, spatial Cournot competition gives a result that is consistent with frequently observed clustering of establishments in the real-world. As Irmen and Thisse (1998) pointed out, there are alternative explanations in the literature justifying the agglomeration of competing firms. In their theoretical analysis, they identify conditions under which competition between firms, competing across multiple dimensions of product differentiation, can lead to price competition between firms being relaxed.

The current large sample size facilitates an analysis of the effects of spatial competition on meal prices. The data set can be used to distinguish the impact of restaurants offering close substitute products in terms of cuisine, and restaurants offering alternative cuisine types. As a secondary objective, the study models the relationship between meal prices and quality scores and confirms the finding of a positive relationship from the rich data set. In the next section the data are described.

3. DATA

Editions of The UK Good Food Guide (GFG) 2003 to 2011 provided the data for most of the restaurant variables, including information on the average price of a three course meal in a given restaurant, restaurant location, restaurant facilities such as seating capacity, affiliation to a hotel, a separate bar, and the Guide's score out of a maximum of ten for a restaurant, for restaurants across the UK. See Appendix A for details of the meaning of the scores awarded, and Appendix B for details on all key variables. Attention is restricted to restaurants that enjoy full entries in the GFG, rather than restaurants that are classed, for example, as 'Also Recommended' as only much more limited information is available on these restaurants. According to its website, www.thegoodfoodguide.co.uk, the Good Food Guide sends out a team of anonymous inspectors based around the UK. These inspectors include ex-restaurateurs and chefs, experienced writers and food critics. The GFG puts potential new inspectors through a series of tests to demonstrate their credentials as judges before they can be enlisted. The full list of over 1,000 inspectors and reviewers is recorded in the GFG, but allocation of inspectors to particular restaurants is not revealed. Also note that reader feedback will influence the choice of restaurants to visit. Some restaurants stay in the Guide for the whole period of analysis, while some move in and out. Some previously included restaurants shut down but it is not possible to distinguish between GFG exclusion and closure. Consequently, the selection of restaurants included in the Guide cannot be modelled, given the lack of systematic information about excluded restaurants.

Prices in the Guide are taken from questionnaire returns that are checked by the anonymous inspectors. It should be noted that the definition of meal price reported in editions of the GFG changes. Prior to 2007, price is the cost of a three course meal (lunch or dinner) for one person, including coffee, house wine, service and any cover charge where applicable. In 2007 the price is for a three course dinner for one person, again including coffee, house

wine and service. From 2008 onwards, price reflects the average cost of a three course dinner excluding wine. Nevertheless, the inclusion of year effects will take account of these differences. These data were supplemented by categorical variables indicating whether a restaurant had been awarded one, two or three Michelin stars in a particular year. Restaurants were linked to particular locations by matching their UK addresses to geocodes. This enabled consideration of competing restaurants in any radii, and variables were constructed to capture competitiveness in terms of the number of restaurants that offer the same and alternative types of cuisine within a two-mile, two to five-miles and five to ten-miles discs. See Appendix B for details.

Figure 1 shows the distribution of Good Food Guide scores for all included restaurants over the sample period. Only two restaurants have ever achieved the maximum score of 10. One is the Fat Duck at Bray, Berkshire, owned by Hester Blumenthal and the other is the Gordon Ramsay Restaurant, London. Hester Blumenthal and Gordon Ramsay are examples of celebrity chefs, defined here as any chef who has appeared on a television cookery programme.[4] This information is contained in restaurant summaries written in the Good Food Guide. Figure 1 reveals that almost 70% of restaurants in the sample have received quality scores of between two and four.

In addition, restaurants were linked to individual UK districts, as listed in Office for National Statistics publications. Typically these districts are associated with individual cities or large towns. It was then possible to associate each restaurant with figures for the magnitudes of the local population and average income. Population data were taken from The Office for National Statistics, while mean gross annual pay of employees is used as a measure

[4] For a theoretical contribution developing the concept of celebrity, see Rindova et al (2006). Gergaud et al (2012) offer an empirical analysis of careers of top chefs in France. The GFG notes the chef(s) responsible for its selected restaurants but we do not have complete data on chef careers for UK restaurants. An analysis of the 'superstar' characteristics of top chefs is a promising avenue for further research.

of income for each area, these data taken from the Annual Survey of Hours and Earnings.[5] All variables in monetary values were deflated using the Consumer Prices Index (2005 = 100), and the resulting real income and price variables, as well as the quality scores and counts of numbers of competing restaurants, were then logged. The final dataset comprises a full, unbalanced panel of 8,558 restaurant observations over nine years covering 2,998 restaurants.

In Table 1, the average three-course meal prices for London and other cities, by cuisine type, are shown. In general, French restaurants charge the highest prices and these are approximately eight pounds more in London. In London, on average, Vegetarian restaurants provide the lowest priced three-course meals. On average, a three-course meal in London costs about five pounds (12%) more than outside London.[6]

In Figure 2, the average prices for a three-course meal by food guide score are graphed. It is immediately clear that prices are generally higher in London. However, at higher scores (above eight), it is observed that average prices are higher outside of London, reflecting a very small number of restaurants well-known for their exceptional quality.

Table 2 offers the distribution of cuisine types. Most of the establishments are categorised as offering British food by the GFG and there are 1088 British restaurants that account for 36.29% of total restaurants in the GFG. In the next section the empirical strategy and results are presented.

[5] http://www.statistics.gov.uk/downloads/theme_labour/ASHE/

[6] $\left(\frac{45.72-40.23}{45.72}\right) = .12$

4. EMPIRICAL ANALYSIS

The main goal is to examine how a firm's pricing strategy is affected by its quality indicator and competitive pressures imposed by similar and different restaurants in the neighbourhood. The following empirical model is considered:

$$p_{ilt} = \mathbf{X}\mathrm{B} + \mathbf{Z}\boldsymbol{\Gamma} + \mathbf{S}\boldsymbol{\Phi} + \eta_l + \eta_t + \epsilon_{ilt}$$

where p_{ilt} is the log of the price for a three-course meal charged by restaurant *i* in location *l* at time *t*. **X** are controls for quality score and spatial competition variables; **Z** are controls for observable demographic characteristics for a given location (or city) (*l*); and **S** are controls for own restaurant characteristics. η_l and η_t are city and time effects and ϵ_{ilt} is the error term.

As previously mentioned the Good Food Guide Score is used as the key variable to examine effect of quality on prices. The use of log score helps capture potential non-linearity in the price-score relationship.[7] In addition, information is included on awards of Michelin stars. These are much-sought and highly exclusive categories, graded one to three stars, typically given to restaurants that serve French or French-influenced cuisine. It is predicted that meal prices of restaurants will be higher for Michelin-starred restaurants than for excluded restaurants over and above any effect of GFG scores.

The main spatial competition variable is the number of restaurants within certain radii. The number of restaurants within certain radii is further divided into two groups, according to closeness of cuisine type, in order to disentangle the effects from similar and dissimilar restaurants. These two types of restaurant can be considered 'similar' (close substitutes offering similar cuisine, hence 'rivals' competing for customers) and 'different'

[7] The use of dummy variables to indicate groups of scores was ruled out due to excess zeros in the spatial restaurant score dummy variables.

restaurants (imperfect substitutes offering different cuisine, not necessarily competing for the same customers). As an example, two British restaurants accredited by the GFG in a given neighbourhood would be 'similar' while a British and Italian restaurant, also in the GFG for a neighbourhood, would be 'different'.

The choice of ring radii reflects an interest in estimating the extent of the spatial competition among the two types of restaurant. The majority of UK cities or towns are approximately 10 miles apart of each other and a city centre is not more than four miles in diameter. Therefore, a two mile radius captures a majority of the central business districts and hence competing firms. The alternative choice of distances in which restaurants may compete subdivides into rings by radii from 2-5 and 5-10 miles. These rings are intended to capture the concentration of similar/dissimilar restaurants in adjacent commercial clusters, but not to capture all firms within a city. These spatial competition variables are constructed for each firm given their geographic location. Note that these density measures are based on actual physical addresses of establishments and not by a city level sum. Competition summary statistics are provided in Table 3. When considering similar restaurants there are approximately 2.5 restaurants within a two mile radius. Hence, it is reasonable to assume that these restaurants in the GFG are competing in an oligopoly market.

Considering own restaurant characteristics, the log of the Good Food Guide Score is included as one of the main variables of interest. Also included as control variables are the relative size of the establishment; dummy variables to indicate whether the restaurant has one, two or three Michelin stars; and other variables such as air-conditioning, parking facilities, ownership by the chef, attachment to (or location within) a hotel, inclusion of a bar, whether children are welcome or not, live music, smoking permitted or not, and availability of 'quality' wine as identified by the Good Food Guide. This is a discrete category where the GFG inspector deems the wine list to be exceptional. All of the dummy variables that capture

restaurant characteristics were taken from descriptions of restaurants in the Good Food Guide, partly from interpretation of the narrative and partly from symbols used by the GFG in its summary display of restaurants in the main header. This information was in turn collated from questionnaires submitted by the restaurants included in the Guide.

Finally, with respect to demographics, population and average income of the relevant town, city or area are included. Regional and city effects are included to control for unobservable area characteristics. Year effects control for market fluctuations.

Table 4 reports the basic regression variable summary statistics. The average price charged by a restaurant in the GFG for a three course meal is about 42 pounds while it can seat approximately 80 customers. The average quality score is about 3.5 and the average per person income in the located area is about 27,750 pounds. Looking at the data, 186 restaurants are owned by a celebrity chef. Out of these celebrity chef owned restaurants only 44 have received Michelin stars (24 one star, 12 two stars, and eight three stars) while there are 165 Michelin star restaurants in the whole of the UK (133 one star, 23 two stars, and nine three stars). Results also indicate that about 20% of the establishments are attached to a hotel while 26.6% offer ‘quality wines’. Also note that 26% of the restaurants are located in London.

The empirical model is estimated with and without restaurant level fixed effects. First, regression results are presented with firm effects in columns 1 and 2 in Table 5. These use three distinct rings around a given restaurant to capture spatial competition. Results indicate how average prices and ‘Good Food Guide score’ are related. The coefficients of the ‘Good Food Guide score’ suggest that, as this (log) score increases, the average price of three-course meals increases. Across all specifications, the point estimate on score suggests a minimum increase of 25% increase in meal price associated with a 100% rise in score (for example 1 to

2, 2 to 4, 3 to 6). As such, consumers can use price as a signal of quality for this experience good.[8]

As in any market, own price is expected to decline as the available number of perfect substitutes increases (number of similar restaurants). This effect should be largest when the number of firms within close proximity increases. Note that, on average, there are only about 2.5 similar restaurants within two miles of a given establishment. However, the results indicate that prices increase as the number of similar restaurants increase within two miles. Over the two to five and five to 10 mile rings, an increase in number of competing restaurants leads to a price reduction at a typical restaurant in the sample. For the standard competition effect to hold, it appears that sufficient distance from a given restaurant needs to be considered according to the estimates. When less close substitutes are considered, represented by restaurants offering different cuisine, no significant impact on price is found as the number of dissimilar restaurants increases within close proximity.

These results indicate that firms in close proximity are not engaged in Bertrand competition, but in fact price competition is relaxed. This result of a relaxation of price competition when there are multiple characteristics of horizontal differentiation is supported by the theoretical work of Irmen and Thisse (1998). It is worth highlighting that it is found above that restaurants react to an increased number of rivals (beyond five miles) by reducing prices in order to attract consumers. Hence, a complete lack of competitive behaviour is not observed. Rather, there may be some coordination of prices within a two mile area, but as the number of similar restaurants increases further away, restaurants feel under pressure to reduce prices to attract consumers to the neighbourhood in which they are situated.

In the statistical analysis, restaurant size is proxied by total number of seats. The results on size effects indicate that large restaurants tend to charge a lower price. This result

[8] It is possible that the quality score is correlated with the error term. Then we will be underestimating the effect of score on price. However, it is worth noting that average within firm mean quality score difference is -.008 with a variance of 0.245 indicating that quality score does not change often.

is attributed to economics of scale. When considering other restaurant specific controls that change within a firm, if a restaurant has a 'Celebrity chef', then price is higher by about 17%. This effect is even larger for restaurants with Michelin stars where the price is higher by 7%, 10% and 41% when they receive a one star, two star and three star Michelin ranking, respectively.[9]

Considering market characteristics, an increase in population is significantly associated with higher meal prices in columns 1 and 2 in Table 5. However, changes in regional income do not significantly affect meal prices. The year effects indicate an interesting pattern. Compared to 2002, average price of a three course meal increased until 2006. During the housing bubble burst prices declined considerably, by about 25%. However, 2011 saw a small recovery in prices by about 2.5%.

Note that while the fixed effects models account for unobservable heterogeneity within restaurants, these do not permit examination of the effects of time-invariant restaurant characteristics. Therefore, to consider the effects of restaurant characteristics, the models are re-estimated, replacing restaurant fixed effects with observable characteristics. These results are reported in the last two columns of Table 5. The competition variable results are qualitatively similar to the ones discussed earlier. Two interesting changes in results pertain to the variables 'Celebrity chef' and 'Michelin stars'. Having a 'Celebrity chef' enables a given restaurant to charge 13% more in meal price compared to not having a celebrity chef. A 'three star Michelin' restaurant can charge 91% more compared to other GFG restaurants without Michelin stars while a 'one star Michelin' restaurant can charge 12% more.

Similarly, air conditioning, parking, attachment to a hotel, having a bar, availability of top wines, are all associated with increased average price while welcoming children, ownership by chef, and playing recorded music are all associated with reduced prices.

[9] Impacts of dummy variables are obtained from the formula $\exp(\gamma) - 1$ where γ is the regression coefficient on a given dummy variable.

Considering location effects, London and Scotland have price premia and the London premium is around 7% – 9% compared to the rest of England. These effects of restaurant characteristics would all appear to be plausible. Parking facilities, air conditioning and availability of top quality wine would be welcome. Ownership of restaurant by the chef typically occurs in smaller family-run restaurants which charge lower prices than other establishments. Diners would probably consider a visit to a GFG-accredited restaurant as a special occasion and would not wish to be disturbed by children or recorded music. The performance of these control characteristics variables in the regression models adds credibility to the findings on the spatial competition variables.

5. CONCLUSIONS

Despite local pricing differences, the price of a restaurant meal is consistently found to reflect the quality of the restaurant, and as such can be used by consumers as a guide to the quality of this experience good. This supports a large body of theoretical and empirical literature that indicates a quality signalling role of price (Gerstner, 1985; Bagwell and Riordan, 1991; Adriani and Deidda, 2011). More interesting still are the conclusions from the regression results that can be drawn about the nature of competition between neighbourhood restaurants. The nature of competition between restaurants is more 'friendly' than may have been expected when the relationship between the number of rival local restaurants and restaurant pricing policy is considered. Specifically, an increasing number of local restaurants in a narrowly defined neighbourhood offering the same type of cuisine results in price increases for a given restaurant. This finding supports the theoretical result of Irmen and Thisse (1998), that price competition can be relaxed in an industry that exhibits multiple characteristics of horizontal product differentiation. In this context, it is worth examining the possibility of

reduced price competition in other consumer goods sectors, supplying experience goods or otherwise.

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REFERENCES

Adriani F. and Deidda L. (2011) Competition and the Signaling Role of Prices, International Journal of Industrial Organization 29, 412-425.

Ahlfeldt G.M. and Maenning W. (2013) External Productivity and Utility Effects of City Airports, Regional Studies 47, 508-599.

Albrecht J., Lang H. and Vroman S. (2002) The Effect of Information on the Well-Being of the Uninformed: What's the Chance of Getting a Decent Meal in an Unfamiliar City?, International Journal of Industrial Organization 20, 139-162.

Anderson M. and Magruda J. (2012) Learning from the Crowd: Regression Discontinuity Estimates of the Effects of an Online Review Database, Economic Journal 122, 957-989.

Bagwell K. and Riordan M. (1991) High and Declining Prices Signal Product Quality, American Economic Review 81, 224-239.

Banerjee A.V. (1992) A Simple Model of Herd Behavior, Quarterly Journal of Economics 107, 797-817.

Becker G.S. (1991) A Note on Restaurant Pricing and Other Examples of Social Influences on Price, Journal of Political Economy 99, 1109-1116.

Benfratello L., Piacenza M. and Sacchetto S. (2009) Taste or Reputation: What Drives Market Prices in the Wine Industry? Estimation of a Hedonic Model for Italian Premium Wines, Applied Economics 41, 2197-2209.

Berry S. and Waldfogel J. (2010) Product Quality and Market Size, Journal of Industrial Economics 58, 1-31.

Bresnahan T.F. and Reiss P.C. (1991) Entry and Competition in Concentrated Markets, Journal of Political Economy 99, 977-1009.

Chossat V. and Gergaud O. (2003) Expert Opinion and Gastronomy: The Recipe for Success, Journal of Cultural Economics 27, 127-141.

Combris P., Lecocq S. and Visser M. (1997) Estimations of a Hedonic Price Equation for Bordeaux Wine: Does Quality Matter?, Economic Journal 107, 390-402.

Ehrmann T., Meiseberg B. and Ritz C. (2009) Superstar Effects in Deluxe Gastronomy – An Empirical Analysis of Value Creation in German Quality Restaurants, Kyklos 62, 526-541.

Falvey R.E., Fried H.O. and Richards B. (1992) An Hedonic Guide to New Orleans Restaurants, Quarterly Review of Economics and Finance 32, 123-133.

Fleck R.K. and Hanssen A. (2008) Why Understanding Smoking Bans is Important for Estimating their Effects: California's Restaurant Smoking Bans and Restaurant Sales, Economic Inquiry 46, 60-76.

Fogarty J.J. (2012) Expert Opinion and Cuisine Reputation in the Market for Restaurant Meals, Applied Economics 44, 4115-4123.

Freccia D.M., Jacobsen J. P. and Kilby P. (2003) Exploring the Relationship between Price and Quality for the case of Hand-Rolled Cigars, Quarterly Review of Economics and Finance 43, 169-189.

Gergaud O., Guzman L.M. and Vincenzo V. (2007) Stardust over Paris Gastronomic Restaurants, Journal of Wine Economics 2, 24-39.

Gergaud O., Smeets V. and Warzynski F. (2012) Learning by Cooking and Reputation Quality: A French Recipe to Become a Top Chef, University of Bordeaux, mimeo.

Gerstner E. (1985) Do Higher Prices Signal Higher Quality?, Journal of Marketing Research 22, 209-225.

Graddy K. and Margolis P. (2011) Fiddling with Value: Violins as an Investment?, Economic Inquiry 49, 1083-1097.

Gunawardana P.J. and Havrila I.I. (1996) An Analysis of Restaurant Characteristics and Meal Prices in Melbourne, Tourism Economics 2, 79-93.

Irmen A. and Thisse J.F. (1998) Competition in Multi-Characteristics Spaces: Hotelling was Almost Right, Journal of Economic Theory 78, 76-102.

Kalnins A. (2003) Hamburger Prices and Spatial Econometrics, Journal of Economics and Management Strategy 12, 591-616.

Keynote (2011) Market Report Plus 2011: Restaurants edited Capstick, L., www.keynote.co.uk

Kiel K.A. and Zabel J.E. (2008) Location, Location, Location: The 3L Approach to House Price Determination, Journal of Housing Economics 17, 175-190.

Nelson P. (1970) Information and Consumer Behavior, Journal of Political Economy 78, 311-329.

Pal D. and Sarkar J. (2002) Spatial Competition among multi-store Firms, International Journal of Industrial Organization 20, 163–190.

Rindova V., Pollock T. and Hayward M. (2006) Celebrity Firms: The Social Construction of Market Popularity, Academy of Management Review 31, 50-71.

Roma P., Di Martino G. and Perrone G. (2013) What to Show on the Wine Labels: A Hedonic Analysis of Price Drivers of Sicilian Wines, Applied Economics 45, 2765-2778.

Appendix A: Good Food Guide Scores

Score	
1 – 2	Competent cooking. Sound, basic and capable cooking where restaurants scoring 2 use better ingredients, take fewer short-cuts, please more reporters and make good neighbourhood restaurants.
3 - 4	Competent to good cooking. Use of fine ingredients with appropriate cooking, although with some inconsistencies with reporters being pleased most of the time. Restaurants scoring 4 reveal greater skill in handling materials and have special standing in their locality.
5 - 6	Good to very good cooking. Restaurants use high quality ingredients, achieve consistently good results and are enthusiastically reported. Restaurants scoring 6 have extra flair and are considered to be among the best in the region.
7 - 8	Very good to excellent cooking. High levels of ambition and achievement with the finest ingredients applied with skill and imagination. Restaurants scoring 8 are worth a special effort to visit.
9 – 10	This very best category is reserved for only a few restaurants that are highly individual and display impressive artistry by the head chef. These restaurants compare favourably with the strongest international competition.

Source: Good Food Guides (various)

Appendix B: Key Variable Definitions

Price (£)	Price of a three course meal for a given restaurant as recorded by the *Good Food Guide*
Number of similar restaurants within $r_i - r_j$ miles	This is the number of restaurants (n_d) that offer similar cuisines within r miles. The log values of this variable are taken log(number of restaurants + 1).
Number of different restaurants within $r_i - r_j$ miles	This is the number of restaurants (n_d) that offer different cuisines within r miles. The log values of this variable are taken log(number of restaurants + 1).
Number of seats	Total number of seats in a restaurant, inside and outside
Score	Good Food Guide restaurant score out of 10
Average income (£)	Average income in the local area
Average population	Average population in the local area
Dummy variables	
Takes value of 1 if:	
One Michelin star	Restaurant has one Michelin star, taken from editions of *Michelin Guide*
Two Michelin stars	Restaurant has two Michelin stars
Three Michelin stars	Restaurant has three Michelin stars
Restaurant characteristics	
Air-conditioning	Air conditioning in dining room
Parking	Parking on site
Owned by the Chef	Restaurant is owned or part-owned by the head chef
Inside of a hotel	Restaurant is situated within a hotel
Bar	Restaurant has a separate bar
Children welcome	Restaurant welcomes children and offers children's meals
Music	Restaurant plays recorded music
Smoking	Restaurant permits smoking inside the premises subject to smoking in public places being legal
Top quality wine	Restaurant has a wine list accredited as top quality by inspectors
London	Restaurant is situated in the Greater London area
Scotland	Restaurant is situated in Scotland
Wales	Restaurant is situated in Wales
N. Ireland	Restaurant is situated in Northern Ireland

Table 1: Average Prices by Cuisine (£)

Cuisine	London	Outside London
American	45.25	31.75
	(8.60)	(1.96)
British	42.55	39.90
	(13.15)	(1.87)
Chinese	42.97	37.79
	(17.68)	(7.43)
European	47.00	42.19
	(16.53)	(14.08)
French	55.89	47.63
	(18.99)	(18.35)
Fusion	51.50	38.60
	(18.20)	(7.97)
Gastro pub	32.20	29.43
	(8.08)	(7.04)
Greek / Mediterranean	38.72	39.08
	(11.15)	(8.96)
Indian / Pakistani	41.56	27.15
	(14.27)	(8.65)
Italian	46.27	36.35
	(13.31)	(1.09)
Japanese	51.78	32.02
	(23.72)	(1.38)
Middle Eastern / Moroccan	33.91	31.25
	(11.78)	(5.41)
Other Asian	41.33	44.74
	(9.48)	(15.30)
Seafood	48.41	40.55
	(13.55)	(11.44)
South American	31.91	--
	(5.91)	
Spanish	34.10	31.54
	(1.15)	(8.61)
Thai / Vietnam	43.53	32.00
	(17.45)	(9.53)
Vegetarian	28.19	28.60
	(5.72)	(7.51)
Average price	45.73	40.23
	(17.00)	(13.01)

Standard deviations are in parentheses.

Table 2: Number of restaurants offering different cuisines

Type	Frequency	Percent
American	7	0.23
British	1,088	36.29
Chinese	53	1.77
European	692	23.08
French	364	12.14
Fusion	68	2.27
Gastropub	178	5.94
Greek / Mediterranean	28	0.93
Indian / Pakistani	87	2.90
Italian	139	4.64
Japanese	48	1.60
Moroccan / Middle Eastern	14	0.47
Other Asian	22	0.73
Seafood	149	4.97
South American	6	0.20
Spanish	28	0.93
Thai /Vietnam	13	0.43
Vegetarian	14	0.47
Total	**2,998**	**100**

Table 3: Restaurant level summary statistics

Variable	All	London	Outside London
Similar restaurants			
0-2 miles	2.598	8.803	0.396
	(5.658)	(8.228)	(0.923)
2-5 miles	3.480	12.013	0.453
	(7.096)	(9.406)	(1.358)
5-10 miles	2.584	6.472	1.205
	(5.517)	(6.883)	(4.144)
Different restaurants			
0-2 miles	0.103	0.296	0.042
	(0.394)	(0.664)	(0.220)
2-5 miles	0.298	1.020	0.087
	(0.905)	(1.511)	(0.328)
5-10 miles	0.813	2.858	1.296
	(2.195)	(3.526)	(7.326)

Standard deviations are in parentheses.

Table 4: Regression variables

Variable	Mean (Standard deviation)
Average price (£)	41.667 (14.370)
Average number of seats	67.386 (56.420)
Average score	3.486 (1.556)
Average income (£)	27,735.29 (9,196.59)
Average population	1247.614 (1289.835)
Celebrity chef	0.053 (0.224)
One Michelin star	0.052 (0.221)
Two Michelin stars	0.012 (0.107)
Three Michelin starts	0.003 (0.058)
Air-conditioning	0.484 (0.500)
Parking	0.450 (0.498)
Owned by the Chef	0.437 (0.496)
Inside of a hotel	0.198 (0.398)
Bar	0.562 (0.496)
Children welcome	0.800 (0.399)
Live music	0.673 (0.469)
Smoking	0.320 (0.467)
Top quality wine	0.266 (0.442)
London	0.262 (0.440)
Scotland	0.091 (0.287)
Wales	0.060 (0.238)
N. Ireland	0.009 (0.095)

Table 5: Regression Results

Variable	**Log (*price* +1)**			
	(1)	(2)	(3)	(4)
Log (*score* + 1)	.253***	.257***	.308***	.282***
	(.012)	(.012)	(.008)	(.008)
Log (*number of similar restaurants* ≤ 2 *miles* + 1)	.016**	.017**	.015***	.016***
	(.006)	(.006)	(.004)	(.004)
Log (*number of similar restaurants* 2 - 5≤ *miles* + 1)	.003	.005	-.014**	-.013**
	(.006)	(.006)	(.005)	(.005)
Log (*number of similar restaurants* 5 - 10≤ *miles* + 1)	-.017**	-.019***	-.020***	-.020***
	(.005)	(.006)	(.004)	(.004)
Log (*number of different restaurants* ≤ 2 *miles* + 1)	.025	.016	.021	.017
	(.014)	(.014)	(.012)	(.011)
Log (*number of different restaurants* 2 - 5≤ *miles* + 1)	.003	.003	.016	.010
	(.012)	(.012)	(.010)	(.009)
Log (*number of different restaurants* 5 - 10≤ *miles* + 1)	.027**	.030***	.016**	.020**
	(.009)	(.009)	(.007)	(.007)
Log (*number of seats* + 1)	-.021**	-.015**	-.023***	-.017***
	(.007)	(.007)	(.005)	(.005)
Log (*income* + 1)	-.002	.009	.115***	.081***
	(.025)	(.025)	(.018)	(.016)
Log (*population* + 1)	.015**	.015**	.002	.005
	(.005)	(.005)	(.003)	(.003)
Celebrity chef	.167***		.126***	
	(.021)		(.012)	
One Michelin star		.068***		.114***
		(.018)		(.011)
Two Michelin stars		.098**		.254***
		(.037)		(.022)
Three Michelin starts		.342***		.647***
		(.096)		(.057)
Smoking	.007	.007	.009	.008
	(.006)	(.006)	(.006)	(.006)
Air-conditioning			.036***	.034***
			(.005)	(.005)
Parking			.036***	.033***
			(.005)	(.005)
Owned by the Chef			-.031***	-.036***
			(.005)	(.005)
Inside of a hotel			.099***	.106***
			(.006)	(.006)
Bar			.018***	.019***
			(.005)	(.005)
Children welcome			-.038***	-.035***
			(.006)	(.005)
Music			-.029***	-.022***
			(.005)	(.005)
Top quality wine			.076***	.065***
			(.005)	(.005)
London			.069***	.083***
			(.013)	(.012)
Scotland			.021**	.026***
			(.008)	(.008)
Wales			.006	.008
			(.009)	(.009)
N. Ireland			-.021	-.023
			(.021)	(.022)
Cuisine effects	Yes	Yes	Yes	Yes
Firm Effects	Yes	Yes	No	No
Number of Obs.	8558	8558	8558	8558
Adj. R^2	.795	.793	.629	.643

Table 5: Regression Results (continued)

Variable	**Log of price**			
	(1)	(2)	(3)	(4)
Year Effects				
2004	.024**	.024**	.038***	.039***
	(.008)	(.008)	(.009)	(.009)
2005	.067***	.065***	.078***	.081***
	(.008)	(.009)	(.009)	(.009)
2006	.115***	.113***	.118***	.122***
	(.009)	(.009)	(.010)	(.010)
2007	.065***	.062***	.065***	.070***
	(.009)	(.010)	(.010)	(.010)
2008	-.229***	-.233***	-.240***	-.235***
	(.011)	(.012)	(.012)	(.012)
2009	-.251***	-.256***	-.269***	-.264***
	(.012)	(.012)	(.012)	(.012)
2010	-.260***	-.265***	-.279***	-.275***
	(.012)	(.013)	(.013)	(.012)
2011	-.236***	-.241***	-.259***	-.255***
	(.013)	(.013)	(.013)	(.012)
Number of Obs.	8558	8558	8558	8558
Adj. R^2	.796	.793	.629	.644

*** denotes statistical significance at 99% and ** denotes statistical significance at 95%. Robust standard errors are in parentheses.

Figure 1 Distribution of Good Food Guide Scores

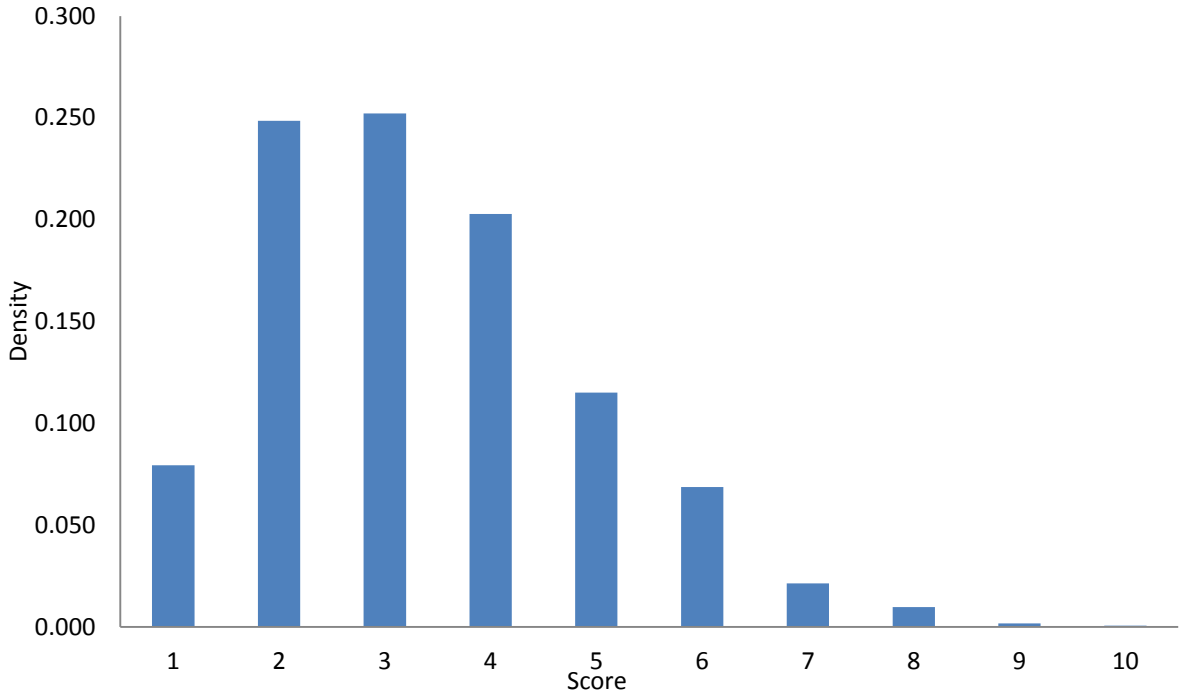

Figure 2: Average Prices by Score (£)