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Stephan Haroutunian
Economics Research Centre
University of Cyprus
SteHar@ucy.ac.cy

Pandelis Mitsis
Economics Research Centre
University of Cyprus
pmitsi@ucy.ac.cy

Panos Pashardes
Economics Research Centre
University of Cyprus
p.pashardes@ucy.ac.cy

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Using Brochure Information for the Hedonic Analysis of Holiday Packages

*Stephan Haroutunian, Pandelis Mitsis and Panos Pashardes**

Abstract

This paper investigates the extent to which hedonic analysis based on information drawn from the brochures of tour operators can be useful in explaining price variation between holiday packages. Using the quality characteristics of holiday packages in the Mediterranean drawn from the brochures issued by two major British tour operators, we find that hedonic analysis can give misleading results when the heterogeneity in the effects of these characteristics is ignored. We illustrate this point using two possible causes of heterogeneity in the effects of quality characteristics: when (a) quality is registered in different ways in the brochures of different tour operators and (b) the effects of quality characteristics differ between packages with a different star rating. The policy implications of our empirical findings are discussed.

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1. Introduction

In this paper we investigate the extent to which the hedonic approach can be useful in explaining price heterogeneity between Mediterranean holiday destinations.

Mediterranean holiday packages sold in north-western European countries differ substantially. For example, looking at the brochure of Thomson, a major tour operator in the British market, the average price of a weekly holiday on a bed and breakfast basis in a 3-star hotel is about 19% higher in Italy than in Cyprus. For a similar holiday package in 4-star hotels the average price difference between Italy and Cyprus is 33%. Following the seminal paper by Rosen (1974), economists often use a hedonic approach to rationalize why goods intending to satisfy a given consumer need coexist at different prices in the same market. On the empirical front, the characteristics approach originated by Lancaster (1971) and Triplett (1975) has rationalised the estimation of hedonic price equations for the investigation of such price differences, as first shown by Griliches, (1961).

The characteristics framework has been applied in the context of tourism by Rugg (1973), Morley (1992), and more recently, by Papatheodorou (2001, 2002). Empirically, the hedonic price analysis has also been used to investigate the price competitiveness of holiday packages for specific operators and destinations (Clewer et al, 1992, Sinclair et al, 1990, Taylor, 1995). Aguilo et al (2001), argue that the diversity of characteristics between tourist packages can be the outcome of a deliberate policy by tour operators because this enables them to create monopolistic competition and increased concentration through which they can control prices.

One issue that remains largely unexplored in the context of the hedonic analysis of holiday packages is the extent to which price differences reflect on the quality characteristics of the package or on the *shadow price* (consumer's valuation) of these characteristics. In this respect our analysis is similar in spirit to the work of Wolverton et al (2000) where hedonic

analysis of house prices is used to demonstrate that the effects of housing characteristics are not invariant across the various regions. Failure to incorporate the dependence of the valuation of a characteristic on the presence of other characteristics of the consumption unit, can lead to misleading and biased estimates of the implicit (shadow) prices obtained from the hedonic model.

The hedonic analysis in this paper is performed, by regressing the price of holiday packages advertised in the brochures of tour operators in the United Kingdom on a large number of characteristics also advertised in the same brochures. These characteristics include meals, aerobics, mini-golf field and satellite TV. Also included in the hedonic equations are parameters capturing the country-specific effect on price, which can be interpreted as quality differences between holiday destinations not accounted for by the quality characteristics advertised in the brochures.

Further on, we investigate the presence of heterogeneity in the effects of quality characteristics by re-estimating the above regressions allowing the parameters to vary between tour operators and hotel categories. The analysis is completed by examining alternative ways of performing hedonic analysis in the area of holiday packages. This analysis is done in the context of a general model including all sources of heterogeneity in the shadow prices of the characteristics considered in the paper.

In the next section of the paper we examine differences in the price of Mediterranean holiday packages offered in the UK with similar official star rating and investigate empirically the extent to which these differences are country specific and/or explained by the facilities included in the package. In section 3 we examine whether the results observed in the previous section can be attributed to measurement errors resulting from tour operators following different standards in editing their brochures. In the following section we investigate the case of heterogeneity of the effects of the quality characteristics corresponding to different hotel categories. In section 5 we are considering alternative manners in which hedonic analysis can be performed. In the final section we conclude.

2. Quality differences between holiday destinations

Two holiday packages allocated the same star rating in different countries may not be of similar quality. For instance, countries with a capacity to expand their tourist sectors may choose to offer holiday packages with the minimum quality components required for the star category in which their package is classified. This strategy will keep the price of the package low, thereby, helping to attract a large number of less wealthy tourists in that star category. In contrast, countries where the tourist sector faces capacity constraints (i.e. an upper limit in the number of beds imposed by the official tourist agency) the producers may offer holiday packages of quality above the minimum in an effort to attract the better off tourists in the same star category. Even in cases where the star category requirements of holiday packages are strictly defined, quality can be differentiated by features that cannot be incorporated in this rating such as the quality of personnel, the level of cleanliness, the quality of food and the level and quality of architectural and fitting arrangements contributing to the atmosphere of accommodation.

In addition to productive capacity, however, quality choice may be affected by other factors, such as the level of technology. In the theoretical literature firms become high or low quality depending on their costs. In other words, technology is the factor that determines quality choice. Schott (2001) provides empirical evidence supporting the hypothesis that countries in early stages of development specialize in low-quality products while more developed countries are high-quality producers. This is consistent with the empirical evidence that rich countries are high-quality producers, as they have better technology and thus are better suited to produce high-quality products. Also, a country's distance from major tourist source countries may also affect quality choice. Seeing travel as a transaction cost rather than an input to the utility function, this cost will be a smaller proportion of the price when the holiday package is of higher quality. Therefore, distant holiday destinations may choose to specialise in high quality packages to reduce the proportion of traveling costs in price.

The majority of consumers are informed about holiday packages from advertisements placed by tourist operators in brochures, the Internet and the media. Invariably this information includes the price and official star rating, generally thought to be the most important indicators of quality. Yet, two holiday packages allocated the same star rating can differ substantially in terms of price. This phenomenon is not observed only between but also within a particular holiday destination where the two packages are rated by the same authority. In this section we document the existence of differences in the price of holiday packages with the same star rating in Mediterranean countries and examine the extent to which these reflect differences in the characteristics described in the brochures of the tour operators offering these packages.

The data used for our empirical analysis come from the brochures of the UK tourist agents Thomson and Thomas Cook in 2003. They include a total of 349 summer 7-day holiday packages offered in the following Mediterranean countries: Cyprus, Egypt, Greece, Italy, Malta, Spain (Mainland, Balearic Islands and Canary Islands), Tunisia and Turkey. The data for each package include price per adult, 3 or 4 official star rating, whether bed and breakfast, half-board or full board and information about the facilities (characteristics) included in the package.

Initially a hedonic analysis is performed, in which the logarithmic price of the holiday package is regressed on country dummies, star rating and whether full board or otherwise. The Cyprus dummy is excluded so the parameters are interpreted as percentage differences from the holiday package in Cyprus. The results of this regression, parameter estimates and their p-values, appear in Table 1, under the heading 'without quality characteristics'. The ranking, in terms of price for a similarly rated 7-day holiday package, shows Cyprus to be the most expensive Mediterranean holiday destination, although the Balearic Islands, the Canary Islands, Italy and, to a lesser extent, Turkey are not significantly more expensive than Cyprus. On the other hand, Cyprus is significantly more expensive than Malta, Tunisia, Greece and Mainland Spain, by 22%, 12%, 6.5% and 6.5%, respectively.

Table 1: Hedonic regressions with and without quality characteristics described in the brochures

Variable	Without quality characteristics		With quality characteristics	
	Coefficient	p-value	Coefficient	p-value
Intercept	6.513	<.0001	6.342	<.0001
4 Stars	0.136	<.0001	0.080	0.000
Full Board & All Incl.	0.202	<.0001	0.153	<.0001
Balearics	0.011	0.7651		
Canaries	-0.005	0.9033		
Greece	-0.065	0.0925		
Italy	0.021	0.6121	0.186	<.0001
M. Spain	-0.065	0.0982		
Malta	-0.222	0.0001	-0.143	0.003
Tunisia	-0.116	0.0302	-0.127	0.004
Turkey	-0.089	0.1167		
Bathroom			0.130	<.0001
Mini Golf			0.054	0.040
Aerobics			0.057	0.024
Tennis			0.050	0.019
Beauty Salon			0.064	0.065
No. of observations	349		349	
R-square	0.2453		0.4226	
Adjusted R-square	0.2230		0.3583	

Source: Thomson and Thomas Cook catalogues.

Next we run the same regression adding 40 quality characteristics appearing in the holiday package descriptions contained in the Thomson and Thomas Cook brochures[1]. The results of this regression, parameter estimates and their p-values, appear in Table 1, under the heading 'with quality characteristics'. To save space, in this case we report only the parameter estimates with a p-value less than .1 (i.e. significant at the 10% level). Now the price ranking shows Cyprus to be substantially cheaper than Italy (by 19%), which was similar in price to Cyprus in the regression without quality characteristics. It is also similar in price with Greece and Mainland Spain, whereas both of these countries appear as

[1] A full list of the holiday package characteristics included in the analysis is available from the authors upon request.

6.5% cheaper than Cyprus in the regression without quality characteristics. Malta and Tunisia continue to appear cheaper holiday destinations than Cyprus, the former by a smaller amount (14%) than in the regression without quality characteristics.

To the extent that price differences reflect differences in quality, the results reported in Table 1 can distinguish between two types of quality content in holiday packages: that conveyed by the description in holiday brochures (e.g. Cyprus) and that not conveyed by this description (e.g. Italy). Furthermore, only 6 out of the more than 40 quality characteristics mentioned in the brochures in our sample appear to have significant impact on the package prices (bathroom in the room instead of just shower, beauty salon, aerobics, access to mini golf field and the presence of tennis court). One could argue that this result suggests that the prospective holidaymakers can learn about the quality of holiday packages only through this limited number of characteristics out of the large amount of information advertised in the brochures of tour operators. If this argument is correct, then tour operators are not very helpful in providing information about the quality characteristics of holiday packages in their brochures.

3. Heterogeneity between agents

The finding that holiday packages are not particularly suited to hedonic analysis using the information in the agency brochures can be the outcome of inadequate modelling of heterogeneity in the effects of quality characteristics. Such heterogeneity exists when different tour operators target their advertising to specific clienteles resulting in them following different standards in editing their brochures. For example, one agency may target prospective holidaymakers with high income or in certain age categories and thus mention only a limited number of characteristics in its brochures, the ones believed to be attractive to its particular clientele. Taking data from brochures edited by different tour operators, like we do in the previous section of the paper, can also result in insignificant

parameter estimates for a large number of quality characteristics due to measurement error.

To investigate this hypothesis we re-estimated the previous hedonic regression allowing the parameters of the package characteristics and other variables (including country dummies) included in it to vary between tour operators in our sample, namely, Thomson and Thomas Cook. The results obtained from this regression are reported in Table 2.

A striking result in Table 2 is that Mediterranean holiday packages of similar star category, country of destination and other characteristics described in the brochures, are offered at a price 42% higher by Thomas Cook than Thomson. Looking at the catalogues of the two tour operators one finds that the prices advertised in the Thomas Cook brochure refer to the so-called extra package, whereas the prices advertised in the Thomson brochure are for standard packages. This supports the argument that the two agencies target different clienteles, with Thomas Cook aiming at the top-end of the summer holiday market.

The ranking of Mediterranean destinations according to their price also differs between the two tour operators: while holidays in Mainland Spain, Greece, Canaries and Cyprus appear to be in the same price category when no distinction is made between tour operators, now the first three destinations appear less expensive than Cyprus, by around 5%, in the Thomson brochure. Furthermore, Italy appears to be 21% more expensive in the Thomson and 9% cheaper in the Thomas Cook brochure than Cyprus.

As far as characteristics are concerned, we observe that 'restaurants' (more than one), 'game room' and 'piano' have significant effects on the package prices of only one of the two agents. The fact that these characteristics were found to be insignificant in the regression where their effect was assumed to be the same for the whole sample (both agents) supports the argument that the information obtained from the brochures of the two agencies may not be comparable. Failing to allow for this in the regression, amounts to averaging the effect of characteristics with a

negative effect in the data of one agent and a positive effect in the data of the other, resulting in a parameter estimate not statistically different from zero.

Table 2: Parameter estimates with agency effects

Variable	Coefficient	p-value
Intercept	6.290	<.0001
4 Stars	0.061	<.0001
Full Board & All Incl.	0.136	<.0001
Thomas Cook (TC)	0.421	<.0001
Canaries	-0.048	0.023
Greece	-0.051	0.011
Italy	0.210	<.0001
Italy*TC	-0.300	<.0001
M. Spain	-0.057	0.025
M. Spain*TC	-0.061	0.088
Malta	-0.130	0.000
Tunisia	-0.165	<.0001
Bathroom	0.106	<.0001
Bathroom*TC	-0.089	0.077
Restaurants*TC	0.036	0.098
Game Room	0.031	0.072
Piano	0.045	0.032
Mini Golf	0.039	0.039
Aerobics	0.051	0.035
Aerobics*TC	-0.085	0.009
Coaching	0.090	0.009
Coaching*TC	-0.152	0.002
Tennis	0.029	0.054
Beauty Salon	0.059	0.014
Playground	0.034	0.056
Playground*TC	-0.052	0.059
Number of Observations	349	
R-square	0.6961	
Adjusted R-square	0.6317	

Source: Thomson and Thomas Cook catalogues.

It is also interesting that features like having a 'bathroom' (instead of a shower), 'aerobics' and 'playground' appear to be associated with holiday

packages of higher price in the Thomson and lower price in the Thomas Cook brochures. This is consistent with the argument that Thomas Cook targets clients with a high level of income. A hotel at the top end of the quality scale is expected to have a bathroom rather than a shower; therefore Thomas Cook advertises these features only for holiday packages at the lower end of the price scale. Also, a holiday package offering a playground is not a main attraction for an expensive hotel as it could be for a hotel of average quality targeting families with children. Another way of saying this is that tour operators chose to report only characteristics that have a high shadow price among the clientele they target.

4. Heterogeneity between hotel categories

Our previous estimates indicate that hedonic analysis based on data obtained from the brochures of different agents can give rise to biased effects of similar holiday package characteristics. Next we examine whether a similar bias can result from potential heterogeneity of the effects of characteristics (shadow prices) corresponding to different hotel categories. Such a bias can arise when consumer's valuation of quality characteristics differs between hotel categories. For instance, air conditioning or access to hairdressing may be considered as a luxury feature of accommodation in 2 or 3 star hotels, but not so in 4 or 5 star hotels. Knowing this clientele heterogeneity, tour operators may choose not to mention these characteristics in the description of holiday packages including stay in a 4 and 5 stars hotel. In a hedonic regression where hotels of different star category are included without allowing for heterogeneity in the description of holiday packages in the brochures, the parameter estimates of a large number of quality characteristics can be insignificant due to measurement error in the data.

We investigate the hotel heterogeneity hypothesis described above using data for holiday packages with stay in 3 and 4 star hotels from one tourist agency (Thomson) to avoid having too many variables (cross-products) in the regression. The results of this investigation are reported in Table 3:

under the heading 'without interactions with 4 star hotels' we report the parameter estimates and their p-values obtained from the regression where the country and the characteristics effects are not allowed to differ between holiday packages in 3 and 4 star hotels. The parameter estimates and their p-values obtained from the regression where this restriction is removed (by including interaction terms between all the variables and a dummy for the 4 star hotel category) are reported under the heading 'with interactions with 4 star hotels' in Table 3.[2]

Commenting on these results, we first note that the effects (shadow prices) of only two quality characteristics appear to be significant (at 10% significance level) and in similar direction (and, more or less, in size) in both regressions, 'coaching' and 'tennis'. Also, 'aerobics' and 'playground' are insignificant in the regression where the parameter estimates are not allowed to differ between 3 and 4 star hotels but become significant for the 3 star category hotels when this restriction is removed. The opposite is true for 'full board' and the dummy variable for Canary Islands: these variables are significant in the unrestricted regression but become insignificant when the parameters are allowed to differ between 3 and 4 star hotels.

Another interesting result in Table 3 is the fact that some package characteristics are significant in both regressions but their effect differs between 3 and 4 star hotels, when this distinction is allowed. For instance, on average 'game room' is associated with 4.2% increase in the price of holiday packages when no distinction is made between 3 and 4 star hotels; when this distinction is made the same characteristic is associated with 10.7% increase in the price of holiday packages in 3-star hotels and only 1% increase in the price of holiday packages in 4-star hotels.

[2] Again, we report only the parameters estimates which are found to be significant at the 10% significance level. A complete list of the parameter estimates is given in the Appendix.

Table 3: Parameter estimates with and without heterogeneity in the effects of characteristics between 3 and 4 star hotels

Variable	Without interactions with 4 star hotels		With interactions with 4 star hotels	
	Coefficient	p-value	Coefficient	p-value
Intercept	6.296	<.0001	6.314	0.000
4 Stars	0.086	0.000	0.138	0.000
Full Board	0.169	<.0001		
Canaries	-0.063	0.046		
Greece	-0.061	<.0001	-0.062	0.029
Italy	0.185	0.043		
M. Spain	-0.063	0.001	-0.040	0.169
Malta	-0.164	0.000	-0.130	0.004
Tunisia	-0.194	0.059	-0.191	<.0001
Bathroom	0.098	0.001	0.062	0.050
Game Room	0.042	0.103	0.107	0.014
Mini Golf	0.062	0.034		
Coaching	0.094	0.029	0.102	0.016
Tennis	0.046	0.041	0.061	0.007
Aerobics			0.047	0.100
Playground			0.036	0.082
Italy * 4 Stars			0.291	<.0001
Bathroom * 4 Stars			0.056	0.055
Pools * 4 Stars			-0.059	0.041
Restaurants * 4 Stars			0.043	0.094
Game Room * 4 Stars			-0.097	0.061
Mini Golf * 4 Stars			0.057	0.086
Basketball * 4 Stars			0.133	0.041
No. of Observations	209		209	
R-square	0.4906		0.5599	
Adjusted R-square	0.3882		0.3867	

Source: Thomson catalogue.

Perhaps, the most striking difference between the regressions with and without interaction terms to distinguish between the effects of holiday packages with 3 and 4 star hotel accommodations relates to the parameter estimate of the dummy variable for Italy. The regression where this parameter is common to both types of hotel accommodation suggests that holiday packages in Italy are 18.5% higher in price than those in the reference country (Cyprus) offering the same quality characteristics. Allowing for differences between 3 and 4 star hotel accommodation shows that while holiday packages with stay in 3 star hotels are similar in the

two countries, the holiday packages with stay in 4 star hotels are 29.1% more expensive in Italy than the reference country.

5. Model selection

In our empirical investigation so far we have examined alternative ways of modeling brochure information for the hedonic analysis of holiday packages offered by Mediterranean countries. In this section we test these alternative modeling approaches to assess which of them fits this information best. Furthermore, we consider an additional piece of information also contained in the brochures, the star rating given by the tour operators. As argued by Clerides et al (2003), the tour operators' ratings should reflect quality better than those provided by national rating because national ratings are typically based on objective criteria and rarely incorporate subjective information such as consumer feedback. To support this argument, they provide empirical evidence showing that holiday prices tend to be associated more with the ratings provided by tour operators than the ratings provided by the national tourist authorities.

We start our empirical investigation by testing the heterogeneity in the shadow price of package characteristics, as reflected by the parameters of these characteristics in the hedonic regression. Through interactions with respective dummies we allow these parameters to vary between (a) the brochures edited by different tour operators, (b) the hotel categories, based on the star ratings awarded by national tourist authorities, and (c) rating systems followed by the national tourist authorities and the tour operators. The results of these tests, reported in Table 4, suggest that while the shadow prices of package characteristics differ significantly between the brochures of tour operators, this is not true for the shadow price heterogeneity between hotel categories and rating systems.[3]

[3] It should be noted here that the joint statistical insignificance of variation in the parameters of package characteristics between hotel categories reported in Table 4 does not contradict the previous finding that a small number of parameters reflecting such

To the extent that heterogeneity in shadow prices can be interpreted as heterogeneity in consumer's valuation of the corresponding package characteristics, the results in Table 4 suggest the existence of a statistically significant preference heterogeneity between the clienteles of different tour operators. This finding is consistent with the fact that Thomas Cook appears to be selling the same holiday packages as Thomson at a higher price. The results in Table 4 also suggest that no statistically significant differences exist between the preferences of tourists staying in different hotel categories and between the preferences of tourists staying at hotels awarded a different star rating by the national tourist authority and the tour operator.

Table 4: Testing different types of shadow price heterogeneity

Model	Heterogeneity	R^2	R^2 adj.	Root MSE	No. of parms	F-test
Tour operators heterogeneity	With	0.711	0.644	0.12073	66	
	Without	0.660	0.622	0.12432	34	0.0257
Hotel category heterogeneity	With	0.406	0.268	0.17310	66	
	Without	0.366	0.298	0.16953	34	0.9598
Rating system heterogeneity	With	0.401	0.261	0.17391	66	
	Without	0.347	0.277	0.17309	34	0.7802

Source: Thomson and Thomas Cook catalogues, only 3 and 4 star ratings in the sample, 349 observations.

Next, we investigate the statistical significance of heterogeneity in shadow prices (tourist preferences) in the context of a general model including all the sources of this heterogeneity considered in this paper: tour operator specializing in different markets, hotel categories addressing the needs of different tourists and hotel rating systems addressing different objectives by the national tourist authorities and the tour operators. In the context of this model we can perform a nested test to show which source of preference heterogeneity fits the data best. The results of this nested test (reported in Table 5) confirm the previous finding that the only statistically significant source of preference heterogeneity in the data is between the clienteles of different tour operators.

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variation are statistically significant (Table 3). This suggests that when these parameters are omitted, their effect is captured by other parameters in the regression.

Table 5: Testing different types of shadow price heterogeneity

Model	R^2	R^2 adj.	Root MSE	No. of parms	F-test
General	0.793	0.668	0.11665	132	
Tour operators heterogeneity	0.711	0.644	0.12073	66	0.2201
Hotel category heterogeneity	0.406	0.268	0.17310	66	0.0087
Rating systems heterogeneity	0.401	0.261	0.17391	66	0.0796

Source: Thomson and Thomas Cook catalogues (3 and 4 star hotels, 349 observations).
Note: The null of the F-tests is the insignificance of heterogeneity (parameter variation) not included in each model.

4. Conclusions

This paper applies hedonic analysis to investigate whether price differences, assumed to reflect quality differences, between holiday packages in Mediterranean countries can be associated with characteristics advertised in the brochures of tour operators. Data from two major tour operators offering holiday packages in the UK are used.

In general, the results show that the descriptions in the agency brochures are not particularly helpful in conveying quality information about the holiday packages, in the sense that only a small number of characteristics such as bathroom (instead of shower), access to a mini-golf field, aerobics, tennis court, game room, beauty saloon, playground and a few other facilities advertised in the brochures appear to be significantly associated with the price of holiday packages. The price (quality) variation is often more associated with the country of destination rather than the advertised quality characteristics of the holiday package.

We further investigate this issue by allowing the parameter estimates (shadow prices) of these characteristics to vary between tour operators and hotel categories. The rationale behind this generalization of the hedonic model is that (i) the information supplied by different agencies may not be comparable if targeted to different sections of the holiday market, and (ii) the effects of quality characteristics can vary between holiday packages offering accommodation in low and high star hotels. The results obtained from this analysis show that the first hypothesis is valid,

as a substantial part of price differences between holiday packages with similar quality characteristics is associated with the tourist agency supplying the package. We also find significant differences in the effects of characteristics across holiday packages with different hotel star rating.

We complete our empirical investigation by examining alternative ways of modeling the hedonics of holiday packages. We find that the shadow prices of package characteristics differ significantly between the brochures of tour operators, suggesting that preferences differ between the clienteles of different tour operators. Such taste differences do not exist between tourists staying in hotels of different (official or brochure) star rating. These results are confirmed in the context of a general model including all the sources of this heterogeneity considered in this paper.

In conclusion, information drawn from the brochures of tour operators can give rise to misleading results when used in hedonic models to explain the price variation across holiday packages. Although the results can improve by allowing for heterogeneity in the reporting of this information in brochures edited by different tour operators, more research is needed to overcome the limitations of hedonic analysis in helping to associate the quality of holiday packages with observable quality characteristics.

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