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Superstition and "lucky" apartments: Evidence from transaction-level data

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ABSTRACT

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Using a sample of apartment transactions during 2004–2006 in Chengdu, China, we investigate the impact of superstitions in the Chinese real estate market. Numerology forms an important component of Chinese superstitious lore, with the numbers 8 and 6 signifying good luck, and the number 4 bad luck. We find that secondhand apartments located on floors ending with "8" fetch, on average, a 235 RMB higher price (per square meter) than on other floors. For newly constructed apartments, this price premium disappears due to uniform pricing of new housing units, but apartments on floors ending in an "8" are sold, on average, 6.9 days faster than on other floors. Buyers who have a phone number containing more "8"'s are more likely to purchase apartments in a floor ending with "8"; this suggests that at least part of the price premium for "lucky" apartments arises from the buyers' superstitious beliefs. *Journal of Comparative Economics* **42** (1) (2014) 109–117. Division of Humanities and Social Sciences, California Institute of Technology, MC 228-77, Pasadena, CA 91125, USA; Hanqing Advanced Institute of Economics and Finance, School of Economics/Finance, Renmin University of China, Haidian District, Beijing 100872, PR China.

1. Introduction

Numerology forms an important component of Chinese superstitious lore. The numbers 6 and 8 are lucky numbers because these numbers sound like the words for, respectively, "smooth" and "fortune", while 4 is considered an unlucky number because its pronunciation is similar to the word for "death". There is ample anecdotal evidence regarding the importance of "lucky numbers" in Asian real estate markets, even real estate markets in non-Asian countries with a high percentage of Asian immigrants.[1]

Using a 10% randomized sample from overall apartment transactions from July 2004 to December 2006 in Chengdu, China, we investigate the impact of superstitions in the Chinese real estate market. A unique feature of our dataset is that we observe a rich set of buyer's characteristics, including arguably exogenous measures of buyers' beliefs in superstition. This allows us to corroborate "superstitious" behavior in the housing market with other types of superstitious behavior, which provides a reality check on the results.

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[1] For instance, see Ni (2011) for a description of a southern California housing market.

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We find that secondhand apartments located on floors ending with "8" fetch, on average, a 235 renminbi yuan (RMB) higher price (per square meter) than other floors. For newly constructed apartments, we do not find a lucky number effect on prices due to uniform pricing of new housing units, but apartments on floors ending in an "8" are sold, on average, 6.9 days faster than on other floors. These results suggest that buyers find apartments located on "lucky" floors to be especially attractive.

Of course, one explanation is simply that buyers in this market are superstitious; this is a *direct* effect of superstition. However, apartments are durable goods, and in durable goods markets, anticipation of high resale prices has important effects on current demand, so that even buyers who are not superstitious may buy a lucky apartment in order to enjoy the higher resale prices in the future; leading to an *indirect* effect of superstition. Exploiting our dataset, we use a unique and unusual measure – the number of "8"'s in a buyer's phone number – as an exogenous measure of how superstitious a buyer is. We find that buyers with more "8"'s in their phone number are more likely to buy apartments on lucky floors; this suggests that at least part of the price premium for apartments on lucky floors arises from intrinsic superstitiousness on the part of buyers.

2. Existing literature

This paper joins a small but growing literature on the effects of superstitions (non-economic beliefs or norms) on economic outcomes in different markets. Bennett and Barth (1973) examined whether individuals born under the signs of the wargod Mars (in the western zodiac) were more likely to pursue military careers. Kramer and Block (2006) ran a field experiment to show that interviewees behave in a more risk-averse fashion on Friday the 13th. Recent studies of the Asian zodiac, including Akabayashi (2008), Bruckner et al. (2011), and Wong and Yung (2005) showed that superstition impacts Asians' marriage and fertility decisions.

Among studies of Chinese numerology, Bourassa and Peng (1999), Chau et al. (2001), Ho (2008), Liu and Wong (2012), and Fortin et al. (2012) have studied the effects of lucky numbers in real estate markets. Woo and Kwok (1994), Woo et al. (2008) and Ng et al. (2010) quantified the value of superstitions in vehicle license plate auctions in Hong Kong. In their study of the impact of driving restrictions in Beijing, Fu and Viard (2011) showed that more (fewer) cars were on the road on days that license plates ending in "4" ("8") were banned, suggesting a skewness in the distribution of digits on license plates consistent with superstition. Hirschleifer et al. (2011) demonstrated a preference towards "lucky numbers" in stock prices in Chinese stock markets.

As far as we are aware, however, this work is the first to correlate superstitious behavior with buyers' characteristics, and thus assess the extent to which the price premiums on "lucky" apartments are driven by whether the buyers are superstitious. We are able to do this due to the unique nature of our dataset, which contains buyer's characteristics (including their phone numbers) which may not be typically available in datasets on housing markets. Superstition and lucky numbers are a long-lasting cultural phenomenon in Asian countries, and we show here that these cultural beliefs can affect economic outcomes. It is also relevant to policymakers. When designing relevant economic policies, it could be necessary to take superstition into consideration. For instance, superstition may lead to mis-pricing in the real estate market relative to market fundamentals which may cause instability in related markets (such as mortgage markets) if the actors in these markets do not account for this superstition effect.

3. The housing market in Chengdu, China

China's real estate market has been one of the most dynamic and fast-growing markets since the 1990s. The recent wave of price surges began as early as 2003. According to statistics from the National Bureau of Statistics of China, the average price of new residential housing rose from 3521 RMB per square meter in 2004, to 4350 RMB in 2006, an increase of 23.5%. The fast increasing house prices have greatly impacted households' social and economic behaviors. We focus here on the housing market of the city of Chengdu, a large city in Sichuan province, in southwestern China.

The data used in this study come from an electronic database, the Chengdu Real Estate Transaction Information System, constructed and maintained by the Bureau of Real Estate Management in Chengdu. The database collects information of all real estate transactions in Chengdu since 2004. The variables include characteristics of the properties (such as apartment price and size), as well as buyer characteristics which were obtained from mortgage-related documents (including education level, employer, position, income, phone number, down payment, mortgage balance, mortgage interest rates, etc.).

In its efforts to evaluate trial reforms to the urbanization and land policies in Chengdu, the Bureau of Real Estate Management in Chengdu drew a random sample from the database to construct indexes and numbers for its annual report. In the sampling scheme, roughly 10% of the observations were randomly drawn, stratified by day, district, and apartment type. The random sample constitutes the data used in this paper. The data covers July 2004 to December 2006, a period in which housing market flourished.[2] During this period, the Chinese government did not yet enact purchase restrictions to regulate the housing market. Later, after our sample period, the government tried to "cool down" the market by limiting the number of

[2] In 2004, the total housing supply was 12 million square meters, which increased to 20 million square meters by 2006. The average price of a new apartment in Chengdu rose from 3241 RMB/m^2 in 2004 to 4256 RMB/m^2 by 2006 (Chengdu Real Estate Development Annual Report, 2006).

Table 1
Descriptive statistics.

	Overall sample		Secondhand apartments		New apartments	
	Mean	Std.	Mean	Std.	Mean	Std.
Total price	341206	154714	288007	134850	358478	156804
Size	115.446	2671.257	85.447	33.770	91.361	33.062
Price per square meter	3872.905	3931.037	3378.143	816.545	4035.067	4489.788
Log price per square meter	8.220	0.280	8.094	0.256	8.262	0.253
Floor	7.534	5.011	4.732	2.519	8.443	5.275
Transaction date	2/15/2006	226.115	8/25/2005	231.275	4/12/2006	193.325
Male	0.539	0.499	0.563	0.496	0.531	0.499
Age	33.082	7.492	33.305	7.432	33.009	7.510
Education						
Less than high school	0.097	0.295	0.096	0.295	0.089	0.285
High school and equivalent	0.253	0.435	0.261	0.440	0.256	0.436
Some college and equivalent	0.650	0.477	0.642	0.479	0.655	0.475
Employer						
Private	0.639	0.480	0.484	0.500	0.690	0.462
SOE	0.144	0.351	0.215	0.411	0.121	0.326
Government	0.217	0.412	0.301	0.459	0.189	0.391
Income	43563	65866	34834	35421	46397	72867
Local	0.410	0.492	0.500	0.500	0.381	0.486
# of 8 in phone number			1.148	0.824		
N	12685		3113		9572	

apartments that could be purchased by people holding local *hukou* (residency permit) and also restricted non-residents from purchasing properties.

We drop apartments purchased for commercial purposes, and those which were heavily subsidized by employers. We also drop apartments located in the bottom two floors as well as the top two floors in each building, because these apartments may include special amenities (basement storage, backyard patio, or rooftop decks) not found in typical apartments. This left 12,685 observations which contain non-missing values for the variables of interest. Of these transactions, 3113 are for secondhand apartments, and 9572 are newly constructed apartments. Table 1 defines and presents summary statistics for the variables used in this study.

4. Empirical approach and results

4.1. Price premium for lucky apartments

We first consider the following linear hedonic price regression:

$$\begin{aligned} Price = {} & \beta_0 + \beta_1 * Floor4 + \beta_2 * Floor6 + \beta_3 * Floor8 + \beta_4 * Floor + \beta_5 * Floor^2 + \beta_6 * Size \\ & + \beta_7 * Size^2 + \beta_8 * Year2005 + \beta_9 * Year2006 + \beta_{10} * Highrise + \gamma * Districts + \delta * Communities + \epsilon \end{aligned} \quad (1)$$

where *Price* is the real price per square meter of the apartment. We test whether three special floor numbers have an impact on apartment prices. This is captured by the three dummy variables *Floor*4, *Floor*6 and *Floor*8, which are dummy variables taking a value of 1 if the apartment is located in floor levels ending with "4", "6" and "8", respectively. We expect the floors ending with the lucky numbers 8 or 6 to be associated with a positive premium and a price discount for floors ending with the unlucky number 4. For convenience, in what follows, we will refer to apartments on floors ending with "8" as "8th floor apartments", and similarly for other floors.

We control for other variables that may have an impact on house prices. *Floor* is the floor level in which the apartment is located, and *Size* is the size of apartment in the premises permit. Because, in general, the price per square meter increases with floor level, floor and floor squared are added to the model in order to accommodate a possibly nonlinear trend. In addition, as households may have different preference on sizes of apartments, we include size and size squared as additional controls. Furthermore, we include year dummies *Year*2005 and *Year*2006 to capture the possible house price fluctuations during the data period.

Although we have dropped apartments located in bottom and top two floors in each building to eliminate potential price effects of special amenities, to better control for the effect, we include additional control variables in our hedonic model. First, a dummy variable *Highrise* is included to control for whether an apartment is located in a high-rise building exceeding 7 floors in height. (In Chengdu, these high-rise buildings usually have elevators while low-rise buildings do not.) In addition, apartments located in high-rise buildings are more likely to be newer, and have better structure. Second, from apartment addresses, we retrieve and create a set of district dummies, proxying for differences in regional development and distance

Table 2
Regression results: lucky number effects on prices.

	Secondhand apartments		Secondhand apartments		New apartments		New apartments	
	Coef.	Std.	Coef.	Std.	Coef.	Std.	Coef.	Std.
Floor4	3.845	25.657		−30.865	117.644			
Floor6	74.466	62.310		256.620*	131.605			
Floor8	246.637***	93.935	235.194**	93.329	8.848	149.803	−26.849	147.276
Floor	37.495**	16.989	41.448**	16.656	30.956	28.416	32.249	28.182
Floor square	0.531	0.835	0.366	0.823	−0.240	1.052	−0.265	1.045
Size	−0.351	1.509	−0.441	1.507	−0.541**	0.244	−0.535**	0.244
Size square	−0.009	0.007	−0.008	0.007	0.000**	0.000	0.000**	0.000
Highrise building	78.138**	34.250	78.037**	34.157	521.822	595.030	567.055	594.125
Chenghua district	−732.995***	66.536	−733.783***	66.526	359.197	855.929	353.028	855.723
Qingyang district	−249.815***	67.346	−249.235***	67.338	1049.836	751.939	1046.933	752.020
Jinniu district	−549.112***	63.207	−549.834***	63.196	611.762	779.379	579.368	778.918
Jinjiang district	−548.737***	74.399	−550.150***	74.382	936.592	750.291	911.648	750.263
Wuhou district	−132.914**	64.497	−133.888**	64.480	1032.098	643.421	1022.207	643.472
Year 2005	199.625***	30.840	199.580***	30.837	321.391	460.347	338.860	460.316
Year 2006	674.961***	33.347	675.139***	33.343	426.887	472.541	441.579	472.539
Constant	3368.414***	112.095	3361.912***	111.398	2317.266***	767.561	2296.431***	765.502
Community dummies	Yes		Yes		Yes		Yes	
N	3113		3113		9572		9572	

* Indicate that the coefficient is statistically significant at 10% level respectively.
** Indicate that the coefficient is statistically significant at 5% level respectively.
*** Indicate that the coefficient is statistically significant at 1% level respectively.

to the city center. Finally, we include community fixed effects to control for the quality of neighborhood amenities, such as good public schools, swimming pools, and gyms.[3]

In Table 2, columns 1 and 2 report results for secondhand apartments and columns 3 and 4 for new apartments. In column 1, we see a significant positive premium for floor 8, but insignificant coefficients on *Floor*4 and *Floor*6. In column 2, we omit *Floor*4 and *Floor*6, and we find a price premium of 235 RMB for 8th floor apartments, which constitutes about 7.0% of the unit price.[4] These results are roughly in line with previous studies of lucky number effects on housing prices: typically, the "8" has the strongest effect, while the others are either weaker or insignificant.

For new apartments, the price premium for *Floor*8 disappears. This is actually not surprising because, unlike the secondhand housing market, apartments in a newly constructed building are sold at uniform prices with, typically, an increasing linear trend for higher floors. Because of this, we expect to see a price effect of superstitions only in the secondhand apartment market, but not in the new apartment market.

4.2. New apartments: do lucky apartments sell more quickly?

For new apartments, then, we look for the effects of superstition in another fashion. In China, developers sell all new apartments within a new community simultaneously; thus, we can assess whether apartment buyers have a preference for the lucky floor by examining whether apartments on lucky floors are purchased sooner:

$$Time = \beta_0 + \beta_1 * Floor4 + \beta_2 * Floor6 + \beta_3 * Floor8 + \beta_4 * Floor + \beta_5 * Floor^2 + \beta_6 * Size + \beta_7 * Size^2 + \beta_8 * Price + \beta_9 * Highrise + \gamma * Districts + \delta * Communities + \epsilon \quad (2)$$

The dependent variable in regression (2) is the standardized purchasing time of the apartment; *Time* is defined as the number of days that an apartment is purchased after the mean/median transaction date of all apartments in the same community. *Time* can be positive or negative, with $Time < 0$ indicating that the apartment is purchased sooner (i.e. before mean/median transaction date of the community). We expect the coefficients on lucky floors to be negative, indicating that apartments on the lucky floors sell faster than the other floors.

In Table 3, we report the results from these regressions. In columns 1 and 2, the dependent variable is the deviation of the purchase duration of a given apartment from the mean purchase duration of apartments in the same community, while columns 3 and 4 reports regressions in which the dependent variable is the deviation from the median purchase duration. The baseline model shows that, on average, 8th floor apartments are sold 6.9 days earlier than apartments on other floors. The results are robust if we use median transaction date instead of mean purchase dates. These results show the existence of a "lucky number" effect also in the new apartment market.[5]

[3] Specifically, we include a set of 167 dummy variables for communities with 10 or more transactions in the data period. We also experiment a regression with 64 dummies of communities with 20 or more transactions in the data period. The results are robust.
[4] The 7.0% is estimated from the regression using log price as dependent variable.
[5] These results are also robust to alternative specifications which included, in lieu of the quadratic trend on *Floor*, a full set of dummy variables for the last digit of the floor on which the apartment is located.

Table 3
Regression results: lucky number effects on transaction time.

	Secondhand apartments		Secondhand apartments		New apartments		New apartments	
	Coef.	Std.	Coef.	Std.	Coef.	Std.	Coef.	Std.
Floor4	0.152	2.199			−0.179	2.220		
Floor6	0.073	2.459			−0.229	2.483		
Floor8	−6.833**	2.799	−6.864**	2.752	−7.056**	2.827	−6.997**	2.779
Floor	−1.080**	0.533	−1.084**	0.528	−1.149**	0.538	−1.144**	0.533
Floor square	0.058***	0.020	0.058***	0.020	0.061***	0.020	0.061***	0.020
Size	0.045***	0.005	0.045***	0.005	0.044***	0.006	0.044***	0.006
Size square	0.000***	0.000	0.000***	0.000	0.000***	0.000	0.000***	0.000
Price per square meter	75.148***	7.928	75.141***	7.927	71.150***	8.006	71.157***	8.005
Highrise building	9.424	11.200	9.395	11.181	5.896	11.310	5.910	11.292
Chenghua district	−30.411*	15.943	−30.381*	15.935	−38.406**	16.100	−38.439**	16.092
Qingyang district	−47.488***	14.167	−47.490***	14.166	−52.683***	14.307	−52.678***	14.305
Jinniu district	−5.536	14.567	−5.505	14.555	−21.288	14.711	−21.311	14.698
Jinjiang district	−38.095***	14.086	−38.088***	14.082	−50.678***	14.225	−50.672***	14.221
Wuhou district	9.570	12.196	9.574	12.194	5.448	12.316	5.448	12.314
Constant	−621.467***	63.946	−621.339***	63.912	−575.248***	64.576	−575.392***	64.541
Community dummies	Yes		Yes		Yes		Yes	
N	9572		9572		9572		9572	

* Indicate that the coefficient is statistically significant at 10% level respectively.
** Indicate that the coefficient is statistically significant at 5% level respectively.
*** Indicate that the coefficient is statistically significant at 1% level respectively.

4.3. Demand- or supply-driven?

There are several explanations for the observed price premium for apartments on "lucky" floors. One is that this price premium arises from greater scarcity of apartments on floors ending in "8", because owners of these apartments may be more reluctant to sell them. In Table 4, we present a frequency table of apartment floors in our dataset. If broken down by the final digit of their floor number, we see that only 60 lucky floor apartments (51 on the 8th floor and 9 on the 18th floor) were sold during our sample period, which is substantially smaller than the number of 7th floor (111) and 6th floor (141) apartments which were sold. However, we also see that the number of 9th floor apartments which were sold (42) is similar to the number of 8th floor apartments which were sold. Further, as shown in Fig. 1, the ratios of secondhand 9th floor apartments to overall 9th floor apartments traded mimic that of the ratios of 8th floor apartments over time. This indicates that the decreasing trend in number of apartments sold in moving up from the 4th to 9th floors is likely due not to seller behavior, but rather reflects some height-related selection: many older apartment buildings in Chengdu (and throughout the rest of China) were low-rise buildings which did not reach above eight floors.

Indeed, when we consider a subsample of only tall buildings ($Highrise = 1$), we see that 8th floor apartments are no longer as scarce as apartments on floors ending in "6" or "7". Furthermore, when we run regressions only on this subsample of secondhand apartments in tall buildings, we find that the price premium for 8th floor apartments is at 216 RMB (per square meter). These results suggest that the observed price premium is not supply-driven, but demand-driven.

4.4. Who buys apartments on lucky floors?

We have demonstrated that the lucky number effects indeed exist both from the perspective of price premium (for secondhand apartments) and on transaction timing (for new apartments). Next, we investigate the characteristics of the buyers who purchase apartments on lucky floors, and see whether these buyers are more superstitious than others who do not purchase apartments on lucky floors. We consider the following regression:

$$\begin{aligned} Purchase8 = {} & \beta_0 + \beta_1 * Male + \beta_2 * Age + \beta_3 * Age^2 + \beta_4 * LessHS + \beta_5 * SomeCol + \beta_6 * Gov + \beta_7 * SOE \\ & + \beta_8 * LogInc + \beta_9 * Local + \beta_{10} * Phone8 + \beta_{11} * Cell + \beta_{12} * Landline + \epsilon \end{aligned} \tag{3}$$

where the dependent variable *Purchase*8 is a dummy variable which takes 1 if the apartment in the transaction is located in floors ending with "8". We include buyers' characteristics as explanatory variables. *Male* is a dummy indicator of the buyer's gender. *Age* is the buyer's age. *LessHS* and *SomeCol* are dummy variables capturing the buyer's education level. *LessHS* takes 1 if the buyer has less than high school education, 0 otherwise. *SomeCol* takes 1 if the buyer is a college graduate, 0 otherwise. The baseline is buyers with high school education. *Gov* and *SOE* are dummy variables indicating whether the buyer works for, respectively, the government or for a state-owned enterprise. The base is buyers who works for private firms or are self-employed. *LogInc* is natural logarithm of buyer's income. *Local* is a dummy variable which takes 1 if the buyer holds local *hukou*, 0 otherwise.

Table 4
Frequency table of apartment floors.

Floor	Overall sample	Secondhand apartments	New apartments
3	2224	921	1303
4	2301	966	1335
5	1672	754	918
6	989	129	860
7	814	104	710
8	750	51	699
9	683	39	644
10	486	26	460
11	359	19	340
12	369	16	353
13	359	19	340
14	335	17	318
15	328	10	318
16	272	12	260
17	153	6	147
18	137	9	128
19	93	3	90
20	70	4	66
21	40	2	38
22	34	1	33
23	33	2	31
24	40	2	38
25	33		33
26	16		16
27	20	1	19
28	27		27
29	7		7
30	4		4
31	2		2
32	5		5
33	3		3
34	6		6
35	4		4
36	10		10
37	7		7
Total	12685	3113	9572

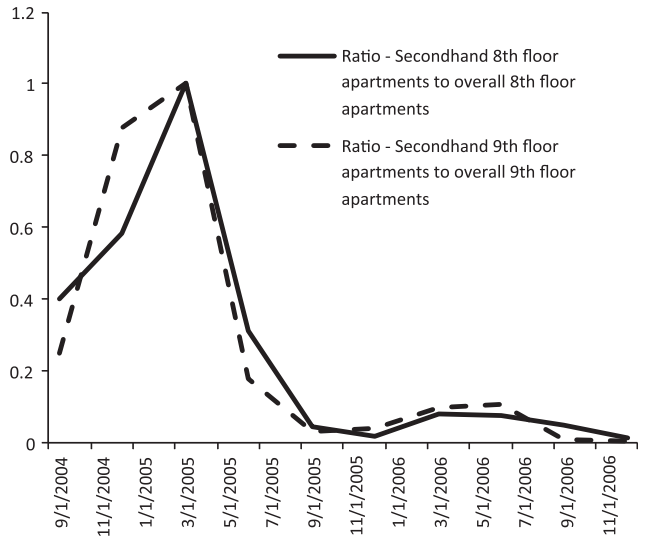

Fig. 1. Sales trend – floors 8 and 9.

Table 5
Frequency of digits in buyers' phone numbers.

Digit	
0	0.979
1	0.820
2	0.662
3	0.677
4	0.518
5	0.723
6	0.831
7	0.667
8	1.145
9	0.702
Total	3113

Table 6
Regression results: who are buyers of lucky floors?

		Coef.	Std.
Male		0.098	0.409
Age		0.089	0.217
Age square		−0.001	0.003
Education			
	Less than high school	−0.861	0.610
	Some college and equivalent	0.463	0.454
Employer			
	SOE	0.256	0.501
	Government	0.175	0.555
Log income		1.848***	0.482
Local		−0.898**	0.428
# of 8 in phone number		0.697***	0.244
Cell		−0.641	0.440
Landline		0.507	0.560
N		3113	

* Indicate that the coefficient is statistically significant at 10% level respectively.
** Indicate that the coefficient is statistically significant at 5% level respectively.
*** Indicate that the coefficient is statistically significant at 1% level respectively.

One buyer's characteristic is unique to our dataset, and merits more discussion: *Phone*8 is the number of "8"'s in a buyer's phone number.[6] We use this variable as a direct measure of the buyer's superstitiousness; phone numbers containing multiple "8"'s are not obtained by chance. Indeed, there is a thriving market for these "lucky" phone numbers, and resale is not typically possible.[7] Furthermore, for the vast majority of buyers in our dataset, the phone number is a private rather than a business number. For these reasons, *Phone*8 is a direct measure of how superstitious a buyer is. Table 5 shows that the frequency of each digit appears in buyers' phone numbers.[8]

Finally, We add dummy variables to control whether the phone numbers provided are cell numbers or landline numbers. If only cell numbers are provided, the dummy variable *cell* takes value 1, 0 otherwise. If only landline numbers are provide, the dummy variable *landline* takes value 1, 0 otherwise. The base case is that both types of numbers are provided by buyers.

We use this measure of superstition to investigate how much the price premium accorded to apartments on lucky floors is driven by superstitious beliefs. In durable goods markets, anticipation of high resale prices has important effects on current demand, so that even buyers who are not superstitious may buy a lucky apartment in order to enjoy the higher resale prices in the future. This *indirect* derived effect of superstition would be absent in non-durable goods markets. In order to isolate the superstition effect from resale effect, we use *Phone*8 to capture individuals' superstitious beliefs in the regressions.

[6] In Chengdu, landline phone numbers have 8 digits and all start with "8". Cell phone numbers have 11 digits and the first 3 digits indicate cell phone carriers and the time when the numbers are purchased. Hence, the first 3 digits mainly show buyers' choice of service provider and the years of service. Therefore, we count the number of "8"'s among the last 7 digits of landline numbers and the last 8 digits of cell numbers. If multiple numbers are provided, we make use of the average number of "8"'s in their phone numbers. We double check our results using number of "8"'s in their full numbers. Our results are robust.

[7] There is a thriving market for cellphone numbers in Chengdu. From the website http://www.028hao.com, one of the largest sellers of cell phone numbers in Chengdu area, the prices for cell phone numbers ending with more "6" or "8" are more expensive. The cell phone numbers with "4" are usually cheaper. For example, cell phone number 13018274884 is priced at 100 RMB and 13018274888 is priced at 880 RMB. Websites http://www.cd10086.com and http://www.10015.com.cn/02810010 also sell phone numbers.

[8] Only 3113 observations were used in computing Table 5 because we only observe buyers' phone numbers in secondhand apartment transactions.

Table 7
Multinomial regression results: who are buyers of lucky floors?

	Coef.	Std.	Coef.	Std.	Coef.	Std.	Coef.	Std.	Coef.	Std.
	Floor 0		Floor 1		Floor 2		Floor 3		Floor 4	
Male	−0.389	0.359	−0.394	0.309	−0.451	0.290	−0.795	1.668	3.153*	1.693
Age	−0.234*	0.138	−0.080	0.134	0.047	0.155	0.679	0.849	0.355	0.849
Age square	0.003	0.002	0.002	0.002	−0.001	0.002	−0.008	0.012	−0.001	0.012
Education	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Less than high school	0.319	5.075	−8.605	372.001	−0.141	3.581	6.305	111.520	4.494	117.230
Some college and equivalent	0.353	0.480	0.316	0.387	−0.170	0.300	1.026	1.943	2.197	1.967
Employer	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SOE	0.168	0.415	0.498	0.383	0.611	0.379	−0.957	1.943	2.277	1.936
Government	−0.024	0.467	0.614	0.400	0.619	0.385	1.444	2.140	−1.163	2.206
Log income	1.330***	0.426	0.551	0.390	0.785**	0.323	−4.141***	1.532	−5.114***	1.541
Local	−0.389	0.376	−0.181	0.306	0.288	0.290	3.351**	1.700	2.231	1.720
# of 8 in phone number	−0.071	0.224	−0.217	0.221	−0.257	0.208	−1.194	1.071	1.654	1.070
Cell	0.515	0.392	−0.290	0.366	0.024	0.309	1.370	2.007	−1.973	2.037
Landline	−0.776	0.631	−0.645	0.458	−0.372	0.384	1.316	2.066	1.182	2.082
	Floor 5		Floor 6		Floor 7		Floor 8		Floor 9	
Male	1.358	1.561	−1.092	0.755	−0.678	0.674	0.072	0.503	−0.783*	0.432
Age	−0.428	0.796	−0.285	0.371	−0.157	0.338	0.128	0.273	−0.025	0.207
Age square	0.001	0.011	0.004	0.005	0.001	0.005	−0.001	0.004	0.000	0.003
Education										
Less than high school	−3.739	85.216	1.657	20.468	0.717	14.201	−1.116	9.267	0.117	6.288
Some college	−4.369**	1.766	0.760	0.942	−0.250	0.794	0.645	0.626	−0.507	0.470
Employer										
SOE	−4.272**	1.832	1.191	0.877	0.225	0.775	0.306	0.575	−0.050	0.492
Some college and equivalent	−2.081	2.012	0.979	0.964	−0.318	0.892	0.080	0.643	−0.153	0.538
Log income	−2.203	1.509	3.597***	0.991	1.413	0.875	2.232***	0.599	1.549***	0.495
Local	−3.545**	1.586	−1.604**	0.785	0.018	0.683	−1.085**	0.536	0.914**	0.460
# of 8 in phone number	−0.806	0.995	0.548	0.468	−0.124	0.435	0.844***	0.303	−0.375	0.294
Cell	0.980	1.867	0.214	0.885	−0.089	0.787	−0.860	0.642	0.108	0.484
Landline	0.646	1.935	−0.218	0.977	−1.057	0.886	0.612	0.600	−0.685	0.579

* Indicate that the coefficient is statistically significant at 10% level respectively.
** Indicate that the coefficient is statistically significant at 5% level respectively.
*** Indicate that the coefficient is statistically significant at 1% level respectively.

Empirical results in Table 6 show that an additional "8" in the phone number increases the probability of purchasing an apartment on the 8th floor by 0.7%. Moreover, as we would expect, there is a significant wealth effect on the probability of purchasing an 8th floor apartment. Finally, we find other variables, such as gender, age, or education level, do not affect this probability.

Given the small, albeit significant, coefficient on *Phone*8, we also ran a whole series of placebo tests, to confirm that *Phone*8 has only a positive effect on purchase incidence for lucky apartments (in line with superstition), but not for apartments on floors without any superstitious significance. We report marginal effects on each floor from a multinomial logit regression in Table 7. The results there show that individuals with more "8"'s in their phone number have a systematic statistically significant propensity for purchasing apartments on the 8th floor, but not for other floors. This reinforces our conclusion above that superstitious beliefs on the part of buyers seem – at least in part – to be responsible for the higher price premium of 8th floor apartments. At the same time, the corroboration between buyers' superstitious behavior in the housing market with other signs of their superstitious beliefs provides a reality check on our results.

5. Conclusion

Using a unique transaction level data with buyers' characteristics in Chengdu, we find that secondhand apartments on floors ending with the digit "8" fetch a price premium of 235 RMB (per square meter) relative to other floors. For new apartments, which are sold at uniform prices, we find that apartments on floors ending in "8" sell 6.9 days faster than those on other floors. We show that buyers whose phone number has more "8" are more likely to purchase a "lucky" floor apartment, suggesting that at least part of the price premium for 8th floor apartments arises from the buyers' superstitious beliefs. Therefore, relative to fundamentals, superstition could be an important source of mispricing in real estate markets.

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References

Akabayashi, Hideo, 2008. Lives of the firehorse cohort: what the statistics show. Japanese Economy 35, 34–54.

Bennett, James T., Barth, James R., 1973. Astronomics: a new approach to economics? Journal of Political Economy 81, 1473–1475.

Bourassa, Steven C., Peng, Vincent S., 1999. Hedonic prices and house numbers: the influence of Feng Shui. International Real Estate Review 2, 79–93.

Bruckner, Tim A., Subbaraman, Meenakshi, Catalano, Ralph A., 2011. Transient cultural influences on infant mortality: fire-horse daughters in Japan. American Journal of Human Biology 23, 586–591.

Chau, Kwong Wing, Ma, Vincent SM, Ho, Daniel CW, 2001. The pricing of luckiness in the apartment market. Journal of Real Estate Literature 9, 31–40.

Fortin, Nicole M., Hill, Andrew, Huang, Jeff JS., 2012. Superstition in the Housing Market. unpublished manuscript, University of British Columbia.

Hirschleifer, David, Jian, Ming, Zhang, Huai, 2011. Does Superstition Affect Stock Prices?. unpublished manuscript, UC Irvine.

Ho, Jennifer, 2008. The Economics of Luckiness: The Impact of Number Superstition on Condominium Prices in Singapore. unpublished manuscript, Amherst College.

Kramer, Thomas, Block, Lauren, 2006. Conscious and nonconscious components of superstitious beliefs in judgment and decision making. Journal of Consumer Research 34, 783–793.

Liu, Haoming, Wong, Wei-Kang, 2012. Field Evidence for a Belief-Based Equilibrium: Personal Beliefs and Beliefs about Others. unpublished manuscript, National University of Singapore.

Ng, Travis, Chong, Terence, Du, Xin, 2010. The value of superstitions. Journal of Economic Psychology 31, 293–309.

Ni, Ching-Ching, 2011. In Arcadia Real Estate, 4 is a Negative Number. Los Angeles Times, May 21.

Viard, Brian, Fu, Shihe, 2011. The effect of Beijing's driving Restrictions on Pollution and Economic Activity. unpublished manuscript, Cheung Kong Graduate School of Business.

Wong, Ka-Fu, Yung, Linda, 2005. Do dragons have better fate? Economic Inquiry 43, 689–697.

Woo, Chi-Keung, Kwok, Raymond HF, 1994. Vanity, superstition and auction price. Economic Letters 44, 389–395.

Woo, Chi-Keung, Horowitz, Ira, Luk, Stephen, Lai, Aaron, 2008. Willingness to pay and nuanced cultural cues: evidence from Hong Kong's license-plate auction market. Journal of Economic Psychology 29, 35–53.