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Names and Reputations: An Empirical Analysis[†]

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This paper tests several predictions from the literature on firm reputation, and confirms a main result: poor performance leads a firm to conceal its reputation. A residential plumbing firm with a record of complaints one standard deviation above the mean is 133.2 percent more likely to change its name. In addition, firms with longer track records are less likely to change their names or exit, while firms with more firm-specific investments, such as advertising, are more likely to change their names than exit. In addition, firms in small markets value their reputations comparatively more than firms in large markets. (*JEL* L14, L25, L84)

A firm's name, or reputation, represents one of its most crucial assets. Owing to this importance, an extensive literature has considered models in which a firm's poor performance reduces the value of its name as consumers update their beliefs regarding the firm's quality.[1] Once the value falls far enough, a firm will change or drop its name to start with a clean record in order to exploit the ignorance of consumers as to who, exactly, is behind the new name.

This paper considers several empirical questions related to firms' names and their reputations. First, does a decline in the value of a firm's reputation lead the firm to change its name, or will the firm simply exit the market? Second, do firm-specific investments, such as advertising, influence a firm's decision to change its name rather than exit? Third, does a firm's response to changes in its reputation vary by market size?

The market for residential plumbing services in Illinois provides a promising empirical setting to address these questions. For one, a plumbing firm's name reflects its reputation, as consumers locate plumbers based on listings in directories like the Yellow Pages and firms advertise to provide information rather than create brands. In addition, plumbing services are experience goods, so uncertainty surrounding a transaction's outcome motivates consumers to base their choice of a firm, in part, on its reputation. Moreover, consumers primarily have uniform preferences over outcomes in the sense that, when a plumber clears a clogged

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[†] To comment on this article in the online discussion forum, or to view additional materials, visit the article page at http://www.aeaweb.org/articles.php?doi=10.1257/mic.3.3.193.

[1] Heski Bar-Isaac and Steven Tadelis (2008) provide a thorough review of the economic literature related to firm reputation.

drain, all consumers consider the transaction a success.[2] Finally, reviews of past transactions on websites such as the Better Business Bureau or Angie's List reflect a firm's reputation.

Using a unique dataset that contains each plumbing firm operating in Illinois between 2008 and 2009, the number of complaints filed against it with the Better Business Bureau, and the aliases or previous names associated with it, this paper tests a main prediction of the literature: failures will decrease the value of a firm's name, reflected here by the revealed preferences of firms that change their names following reported complaints. That is, a firm will change its name when its old name and associated reputation become less valuable than a new name with no extant track record. As such, if firms that receive more complaints are more likely to change their names, all else equal, then this correlation suggests that firms behave strategically by disassociating themselves from bad reputations.

The behavior of firms in this setting accords with the literature's main predictions. Notably, a firm that amassed a number of complaints one standard deviation above the mean in 2008 was 133.2 percent more likely to change its name in 2009. Moreover, firms with more-established reputations were less likely to change their names: a firm one standard deviation older than the average firm was 11.4 percent less likely to change its name. In addition, firms' name choices differed across market sizes: firms outside metro Chicago were 48.5 percent less likely to change their names than firms within the metropolitan area, all else equal. Relatedly, a firm outside metro Chicago was more likely to change its name if it received a large number of complaints relative to a firm within metro Chicago, but was less likely if it had a longer track record. Finally, firms with more firm-specific investments—in this case, advertising—were more likely to change their names than exit: a firm that had advertising expenditures one standard deviation above the mean was 17.8 percent more likely to change its name rather than exit the market given that it did not maintain its status quo.

These results contribute to the scant empirical literature on firm reputation. As noted in Bar-Isaac and Tadelis (2008), a comparatively small body of work has taken the theoretical models of the reputation literature to data. The few that have focus mainly on online marketplaces.[3] For example, Luis Cabral and Ali Hortacsu (2010) find that sellers on eBay are more likely to stop selling on the site after receiving negative feedback, though they do not observe name changes. The online behavior of buyers and sellers may not carry over to offline markets, however, if the anonymity afforded by the Internet causes them to act differently than they would in a "bricks and mortar" environment. This paper contributes to the empirical literature on firm reputation in offline markets, and demonstrates that market entry models which ignore firms that change their names can result in misleading inferences.

[2] This contrasts with other settings in which a reported "success" or "failure" might not be representative of how other consumers would have viewed the result, which makes reported outcomes a less accurate reflection of a firm's reputation (e.g., a meal might be reported by one patron to be a failure because it was "too spicy," whereas another might report the very same meal to be a success because it had "just the right amount of flavor").

[3] Exceptions include Thomas N. Hubbard (2002) and Ginger Zhe Jin and Phillip Leslie (2009), though they do not consider the same topic as this paper, the relationship between a firm's name and its reputation, for which no empirical work exists to my knowledge.

This paper proceeds with Section I which briefly describes the literature's most common models of firm reputation and several of their testable implications. Section II discusses the empirical setting and data. Section III presents a preliminary analysis of the data. Section IV contains the results from a series of regressions motivated by theory. Finally, Section V concludes with a discussion of the main results of this paper and their connection to existing literature.

I. Theory

Models of dynamic reputation and the value of names, such as those in Tadelis (1999), Tadelis (2002), and George J. Mailath and Larry Samuelson (2001), motivate the research questions of this paper. In these models, which are summarized in Bar-Isaac and Tadelis (2008), buyers face uncertainty about the ultimate outcome of a transaction when choosing a seller, which stems from hidden information about the seller's quality or the inability to perfectly contract the seller's level of effort. In light of this uncertainty, buyers base their payments on their expectations of the seller's quality and effort, offering higher wages to seemingly "good" firms.

In a setting with pure hidden information where "good" firms succeed with a strictly greater probability than "bad" firms, rational consumers update their belief about a firm's quality after observing the outcomes of past transactions. Following a successful transaction, consumers revise their assessment about a firm's quality upwards, and downwards after an unsuccessful one. Naturally, as the number of observations increases, consumers become more aware of a firm's true quality and will offer a firm with an established reputation for poor performance lower prices. In response, a firm with a bad reputation might prefer to conceal its type by changing its name when firms with no track record command higher prices than firms with poor track records. The returns from changing a name, however, will depend on many features of the market, such as the ability of consumers to monitor name changes and the arrival rate of new sellers.

Starting over with a de novo name is not the only option available to a firm that has established a poor reputation. Instead, a firm might prefer to purchase a name with a good reputation associated with it rather than continue with its current name or start anew with an unestablished one. And because consumers often associate firms with names rather than individual agents, the long-lived nature of names generates incentives for short-lived agents to build and maintain a good reputation, as their names become tradeable assets that transfer from one generation of sellers to another, an important feature of firm reputation considered by Jacques Cremer (1986) and David Kreps (1990), among others. Tadelis (1999) considers the implications of this environment at length, and motivates the following testable hypotheses.

A. *Measures of Reputation*

The first two hypotheses concern the relationship between a firm's reputation and its decision to change its name or exit the market.

HYPOTHESIS 1: *Complaints reduce the value of a firm's reputation and are thus correlated with a firm's decision to change its name or exit the market, all else equal.*

Because "bad" sellers receive more complaints, consumers will offer lower wages to firms that use names associated with complaints. As a result, names associated with complaints will not represent valuable, tradeable assets and will be discontinued, as predicted by (Tadelis 1999).

HYPOTHESIS 2: *Longer track records are associated with more-established reputations, and therefore older firms will be less likely to change their names or exit, all else equal.*

Conditional on a given number of complaints, firms with longer track records have more-established reputations, as consumers will have observed more outcomes of the firm's transactions. That is, after many years, consumers' beliefs about a firm's quality will converge to the truth and wage offers will be commensurate with the firm's type. As a result, firms that have established poor reputations will benefit from changing their names and beginning anew with a name with no associated reputation. Of course, rational consumers foresee this behavior and offer firms that use names with unestablished reputations lower wages. Consequently, a premium exists for names with established track records, which will manifest in a negative correlation between a firm's age and the likelihood that it will change its name or exit; and a negative correlation between a firm's age and the number of complaints filed against it.[4] In other words, as long as a non-zero mass of "good" sellers arrives each period, "bad" sellers will prefer to pool with them by choosing new names with no track records, or to purchase a name with a good reputation from a retiring "good" seller rather than continue with their current, tarnished names. In either event, names associated with poor reputations will be discontinued and names associated with good reputations will survive, which will generate a negative empirical relationship between the age of a name and the likelihood that it will be changed.

Additionally, if names did not evolve into tradeable assets, older agents nearing retirement would have little incentive to maintain their reputations, which would result in a positive correlation between a firm's age and the number of complaints filed against it. If the data instead show a negative correlation exists, this result would be consistent with the literature's prediction that name trading provides end-of-life reputation-maintenance incentives for firms (Tadelis 2002).

B. *Market Size*

The next pair of hypotheses pertain to the relationship between a firm's decision to change its name and the size of its market. In this setting, market size proxies for

[4] That is, because a firm that has no complaints by period $t + 1$ is more likely to be "good" than a firm that has no complaints by period t, the probability that a firm will prefer to change its name after using it $t + 1$ periods is lower than the probability that it will prefer to change it after t periods since consumers will offer a higher wage to a firm with a good track record of $t + 1$ periods than to one with a good track record of t periods.

several unobserved factors that might influence firm behavior. For instance, consumers might observe a firm's actions more readily in smaller markets, so changing a name will not effectively conceal past outcomes, which resembles the assumption in Tadelis (1999) that a market for names will break down if consumers can observe name changes. At the same time, if word of mouth diffuses more rapidly in smaller markets—for example, if consumers rely on referrals more extensively in small markets as a result of a closer-knit community and a smaller pool of firms to choose from—then a firm's reputation will have stronger effects there than in large markets. These countervailing forces motivate the following hypotheses:

HYPOTHESIS 3: *Firms in smaller markets will be less likely to change their names, all else equal.*

This leads to the empirical question of whether firms in smaller markets value their names comparatively more than firms in larger markets, irrespective of their reputations. That is, for any given level of complaints, if firms in smaller markets are less likely to change their names than firms in larger markets, then this suggests that smaller-market firms have a stronger preference for maintaining a consistent identity.

HYPOTHESIS 4: *Firms in smaller markets will be more responsive to changes in their reputations, all else equal.*

Extending Hypothesis 3, if a firm in a small market relies on its reputation relatively more to attract customers, it will be even less likely to change its name or exit after establishing a good track record than a firm in a large market, and even more likely following complaints. In other words, the reputation mechanism will have more "bite" in smaller markets because having bad outcomes associated with a name in a smaller market causes comparatively more harm, while having good outcomes provides comparatively more benefits; in larger markets, where word of mouth diffuses less rapidly, a name change has less impact. If true, complaints will have a stronger effect on a firm's decision to change its name or exit in smaller markets, while having a longer track record will have a stronger effect on a firm's decision to maintain its name.

C. *Firm-Specific Assets*

The final empirical hypothesis concerns the relationship between a firm's decision to change its name and its investment in firm-specific assets. If a firm possesses valuable assets that will become worthless when it exits the market, it will have a stronger incentive to remain in operation.

HYPOTHESIS 5: *Firms with greater continuation values will be less likely to exit the market, all else equal.*

For plumbing firms, the position of their advertisements in the Yellow Pages represents a valuable asset, as this form of media (still) generates a large amount of business

in this market. In light of this, firms with better advertising positions will be less likely to exit the market altogether, preferring instead to maintain their status quos, change their names, or change owners. As such, a negative correlation will exist between a firm's past advertising expenditures and the likelihood that the firm will exit.

II. Empirical Setting and Data

This paper uses the market for residential plumbing services in Illinois to test the empirical hypotheses presented in Section I. In Illinois, the Department of Public Health regulates plumbers and plumbing-related activities, and licenses approximately 7,300 plumbers and 3,000 apprentice plumbers. To become licensed, plumbers must pass a state licensing exam after completing a 48- to 72-month apprentice program under a licensed plumber, and maintain their skills with continuing education. Throughout Illinois, local municipalities can institute their own plumbing regulations, and occasionally require separate licensing.

Data for the panel of all plumbing firms operating in Illinois between 2008 and 2009 come from a download of the web-based version of ReferenceUSA in June of each year. ReferenceUSA contains information on businesses based on their listings in Yellow and White Pages, and continually updates and cross-checks its entries with direct phone calls and comparisons with other directories. ReferenceUSA's firm-specific entries include the firm's name, address, years in operation, advertising expenditures in the Yellow Pages, and estimated number of employees.[5] For the purposes of this paper, ReferenceUSA has advantages over other datasets because it constructs its universe of firms from a source commonly used by consumers in this market, the local Yellow Pages.

Data for the number of complaints filed against each firm in ReferenceUSA come from a June 2008 download of the Better Business Bureau's website. The Better Business Bureau's website lists a historical record of complaints filed against a business during the preceding three years. A Better Business Bureau staff member reviews each complaint and, if deemed legitimate, contacts the concerned company within two business days. If the company does not respond within 14 days, the Better Business Bureau makes a second attempt to resolve the issue. If not resolved after two attempts, the complaint becomes a part of the company's record with the Better Business Bureau. Data from the Better Business Bureau have advantages over other sources of quality information for plumbing firms, such as Angie's List or Yelp.com, because the Better Business Bureau provides a more comprehensive coverage of the firms operating in Illinois and verifies each complaint.[6]

Matching firms with their respective track records is complicated by the fact that some plumbing firms use more than one name, with firms adding and discontinuing names over time. For instance, some firms have multiple advertisements in the Yellow Pages under different names but a single license number that ties them

[5] Previous academic work has used ReferenceUSA as a data source, though not in a panel. For instance, Joel Waldfogel (2008) used ReferenceUSA, while Katja Seim (2006) and Paul B. Ellickson (2007) both used the offline version of ReferenceUSA, American Business Disc, in their empirical work.

[6] McDevitt (2011) contains a comparison of the information contained on the Better Business Bureau's website with that on other sites, such as Angie's List and Yelp.com, and finds them to be qualitatively similar.

together. Unfortunately, it is not always possible to link names to firms using plumbing licenses, as firms do not consistently list the names associated with each license. In light of this, several approaches were used to determine which firms had multiple names or changed their names between 2008 and 2009. First, names were matched to a common owner using the phone numbers, fax numbers, websites, and addresses listed in ReferenceUSA to generate an initial list of aliases and name changes among the universe of plumbing firms. In addition, names were linked to one another using the known aliases listed in the Better Business Bureau records for each firm, when available. Finally, all firms listed in ReferenceUSA were surveyed by phone to verify their listings, and several were determined to have more than one name or to have changed their names.[7]

These preliminary matches were verified in two ways. First, matches were confirmed on the Illinois Secretary of State's website where firms must register their names.[8] Second, potential matches were verified during phone surveys. By these measures, the original 2,670 names from the ReferenceUSA database were linked to 2,293 independent firms.

For a firm that uses more than one name, its firm-level variables from ReferenceUSA and the Better Business Bureau are constructed by summing over the variables for employees, advertising expenditures, and complaints listed for each of its names.[9] In addition, a firm's years in operation is assumed to be the maximum age of all the names listed for the firm, and that a firm serves the metro-Chicago area if at least one of the names belonging to the firm does.

Some potential shortcomings of these data deserve mention. First, firms that began operating after June 2008 and exited before June 2009 will not appear in the data. Second, any plumbing firm that does not have a Yellow Pages' listing also will not appear in the data. Third, a complete history of a firm's transactions is not available and instead must be inferred using a summary measure—here, the number of complaints filed with the Better Business Bureau—which fails to capture other relevant information regarding a firm's reputation that customers might use, such as referrals. Finally, the data do not include changes of ownership, which precludes a direct examination of name trading among agents that could have important effects on market outcomes (Tadelis 1999).

III. Preliminary Analysis

The data discussed in Section II exhibit several empirical regularities of note. First, over 70 percent of plumbing firms in Illinois have four or fewer employees

[7] This occurred most frequently when a call to Firm X was answered by an individual stating he was from Firm Y.

[8] A firm must register its name with the county clerk of the county(ies) in which it operates. In Cook County, for example, this requires an application fee of $50 and publishing a public notice in the local media. The Secretary of State then issues a Certificate of Good Standing for those businesses meeting the state's requirements, and enforces the requirement that a newly registered name must be "distinguishable" from those names already registered in the state. The department's website is http://www.ilsos.gov/corporatellc/.

[9] In some cases, the Better Business Bureau has uncovered aliases associated with a firm. In that event, the Better Business Bureau does not separately assign complaints to names within a firm. For the sake of consistency, all complaints are aggregated to the firm level. Unfortunately, this precludes examining potentially interesting within-firm behavior related to reputation.

Table 1—Summary Statistics for Plumbing Firms Operating in Illinois in 2008

Variable	Mean	SD	Min	Max
Employees	5.632	15.455	1	300
Years in operation	12.505	8.938	1	25
Ad spending	5,362.7	10,937.5	0	50,000
Complaints	0.389	2.601	0	57
Number of names	1.16	0.659	1	16
Metro Chicago	0.619	0.486	0	1
Observations		2,293		

and the average firm spent $5,363 on Yellow Pages advertising in 2008, as shown in Table 1.[10] In general, these are small businesses that will enter and exit markets without attracting much notice. Second, complaints filed against firms with the Better Business Bureau have a highly skewed distribution: the median number of complaints filed against a firm in 2008 is 0, while a firm at the 99th percentile received 7. In this setting, complaints represent a noisy, but informative, measure of a firm's quality because the time and effort required to file a formal complaint dissuades all but the most disgruntled customers from filing one. Third, the majority of firms (over 90 percent) used only one name in 2008, while 228 firms used more than one. The relative absence of firms using multiple names suggests that only rarely can firms conceal their identities; if most firms adopted this strategy, the entire market likely would break down.

In addition to using more than one name at any given time, some firms manipulate their identities by changing names from year to year. Between June 2008 and June 2009, for instance, firms had one year—and, importantly, at least one cycle of Yellow Pages printing—to change their names in the data. As shown in Table 2, 80 percent of firms made no change between 2008 and 2009, 12 percent exited the market entirely, and 8 percent changed their names by adding and/or dropping a name.

Table 3 documents the distribution of name changes made by firms between 2008 and 2009 to further distinguish among the different types of name changes. Of the firms that changed their names, the most common choice was to drop a name, which would naturally result from a firm deciding to eliminate a past name that no longer attracted a sufficient number of customers to cover its fixed costs of maintenance (e.g., the monthly cost of an additional phone line). This decision likely spans several periods, however, and a longer panel would capture the behavior of these firms more fully.[11] As currently constructed, the available data can be interpreted as representing a short sample from a much longer "repeated economy" because the firms that solely dropped a name between 2008 and 2009 were older, on average, than firms that solely added a name (by 28.1 percent, on average; table not reported).

[10] The amount spent on advertising in the Yellow Pages each year is top-coded at $50,000, which is the approximate cost of a full-page advertisement in a major Chicago directory. This affects 46 firms ($\approx$ 2 percent). A firm's age is also top-coded at 25 years. Approximately 23.3 percent of the listed firms are at the maximum.

[11] For example, a firm that receives several complaints might add an additional name as a response. Over time, its original name will attract fewer and fewer customers as the new name becomes more established. Finally, at some point, the costs of maintaining the old name will outweigh the incremental profits that flow from it and the firm will discontinue its use.

TABLE 2—DECISIONS MADE BY PLUMBING FIRMS OPERATING IN ILLINOIS IN 2008 REGARDING THEIR NAMES IN 2009

Decision	Frequency	Percent	Cumulative
No change	1,838	80.16	80.16
Exit market	270	11.77	91.93
Name change	185	8.07	100.00
Total	2,293	100.00	

TABLE 3—THE TYPE OF NAME CHANGE MADE BY PLUMBING FIRMS OPERATING IN ILLINOIS IN 2008 THAT CHANGED THEIR NAMES IN 2009

Decision	Frequency	Percent	Cumulative
Add only	17	9.19	9.19
Drop only	137	74.05	83.24
Add and drop	31	16.76	100.00
Total	185	100.00	

TABLE 4—SUMMARY STATISTICS FOR EACH TYPE OF DECISION MADE BY PLUMBING FIRMS OPERATING IN ILLINOIS IN 2008 REGARDING THEIR NAMES IN 2009

Mean	No change	Exit market	Name change	Total
Employees	5.6066	3.8148	8.5405	5.6324
Years in operation	13.0936	8.1778	12.9730	12.5050
Ad spending	4,971.5	4,701.7	10,213.5	5,362.7
Complaints	0.2573	0.2630	1.8757	0.3886
Number of names	1.0381	1.0852	2.4811	1.1601
Metro Chicago	0.5914	0.6963	0.7838	0.6193
Observations	1,838	270	185	2,293

Under this interpretation, the firms that exclusively added a name this period will then gradually discontinue names over future periods. As such, the three sub-groups of firms that changed their names are aggregated into one category, and "name changes" refers to changes in the stock of a firm's names.

The groups of firms that made each type of decision varied considerably across their observable characteristics, as shown in Table 4. Notably, the average firm that changed its name had more than seven times as many complaints filed against it in 2008 than the average firm that exited and the average firm that made no change. Note also that firms that changed their names in 2009 had, on average, done so before: the average firm in this group used nearly 2.5 names in 2008, significantly more than the average number of names used by the other two groups ($p < 0.001$).[12]

Moreover, the average firm that changed its name had made more sunk investments, such as advertising and hiring and training employees, that might make it reluctant to exit the market altogether, especially when it had the option of reseting its reputation by changing its name. In this case, advertisements in previous periods

[12] Note that a firm cannot solely drop a name unless it already uses more than one. As a large proportion of the firms that changed their names between 2008 and 2009 fall within this category, it remains unclear whether complaints lead firms to change their names, or whether some other unobserved characteristic correlated with the decision to use more than one name in the past drives this result. An estimation strategy to rule out the latter is discussed in Section IV.

have a firm-specific, but not necessarily a name-specific, "call option" value associated with them due to Yellow Pages' advertising policies that place advertisements within each category heading according to size and tenure. For example, all full-page plumbing advertisements appear before all half-page ads, and within a size category (e.g., full-page, half-page, or in-column) an advertisement's position depends on how long the firm has advertised in the Yellow Pages (e.g., within a particular size category, a firm that has advertised for ten years will appear before a firm that has advertised for five years). Because firms prefer to have their advertisements near the beginning of a category heading to attract notice, a firm's decision to change its name rather than exit will depend, in part, on its stock of past advertising expenditures. That is, a firm that has secured the first position in the Chicago Yellow Pages advertising section possesses a valuable asset and, all else equal, firms with more valuable assets will be less likely to exit the market.

Finally, while it might seem counterintuitive that firms that exited the market entirely received the same number of complaints, on average, as the firms that made no change, it deserves mention that firms also exit markets for reasons unrelated to their reputations.[13] This implies that ignoring the distinction between firms that change their names and those that exit the market entirely could potentially bias estimates of the relationship between a firm's reputation and its name choices—especially as it relates to Hypothesis 5—though previous work does not typically account for this distinction.

IV. Results

To study the patterns in the data further, this section presents a series of regressions that take a firm's decision regarding its name as the dependent variable. In the first set, a firm's decision to change its name and exit the market entirely are grouped together (because these firms have decided to do something other than maintain their status quos). Here, the dependent variable equals one if a firm changed its name or exited between 2008 and 2009, and zero otherwise. Table 5 presents the results from this estimation, specified as a probit.

Consistent with Hypothesis 1, firms that received more complaints were more likely to change their names or exit: a firm with a record of complaints one standard deviation above the mean was 74.7 percent more likely to change its name or exit in 2009. In addition, as predicted by Hypothesis 2, firms with longer track records were less likely to change their names or exit: a firm that had been in operation for one standard deviation longer than the average firm was 6.5 percent less likely to change its name or exit. Finally, firms outside metro Chicago were 32.3 percent less likely to change their names or exit than firms within metro Chicago, all else equal, which is consistent with Hypothesis 3.

[13] For example, a plumber might move to a different state for personal reasons unrelated to his business, or, due to the recessionary environment that disproportionately affected home builders and home owners, these younger and smaller firms might have been forced out of business irrespective of the number of complaints they received because they were less likely to receive loans than their older and larger competitors, and were thus less likely to survive the downturn in business.

TABLE 5—A PROBIT REGRESSION WHERE THE DEPENDENT VARIABLE IS EQUAL TO 1 IF A FIRM CHANGED ITS NAME OR EXITED COMPLETELY BETWEEN 2008 AND 2009, AND 0 OTHERWISE

Variable	Coefficient	(Standard error)	Marg. eff.	(Standard error)
Complaints	0.162***	(0.028)	0.43***	(0.007)
Firm age	−0.094***	(0.018)	−0.025***	(0.005)
Empoyees	0.004	(0.004)	0.001	(0.001)
Ad spending	0.007	(0.009)	0.002	(0.003)
Metro Chicago	0.244***	(0.067)	0.064***	(0.017)
Complaints^2	−0.003***	(0.001)	−0.001***	(0.000)
Firm age^2	0.003***	(0.001)	0.001***	(0.000)
Employees^2	0.000	(0.000)	−0.000	(0.000)
Ad spending^2	0.000	(0.000)	−0.000	(0.000)
Intercept	−0.567***	(0.098)		
Observations		2,293		
Log-likelihood		−1,078.476		
$\chi^2_{(9)}$		127.877		

***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

As shown in the summary statistics in Table 4, the average firm that changed its name between 2008 and 2009 differed in many respects from the average firm that exited the market entirely. As such, pooling these two groups of firms together—as the empirical literature on seller reputation often does—potentially obscures the true effects of reputational changes on firm behavior. Because the data used here distinguish between firms that exited the market and those that merely changed their names, a series of multinomial regressions that treat the two groups as separate provides further insight.

Table 6 presents the results from a series of multinomial probits. In these specifications, a firm makes a categorical decision to maintain its status quo, change its name, or exit the market.[14] As shown in column 1 of equation (1), firms that changed their names and remained in business received more complaints, had shorter track records, spent more on advertising, and were more likely to serve the metro-Chicago area than firms that maintained their status quos. Moreover, as shown in column 1 of equation (2), firms that exited received more complaints, were younger, spent less on advertising (though not to a statistically significant degree), and were more likely to operate in metro Chicago than firms that maintained their status quos.

Focusing on the key variable of interest, a firm with a record of complaints one standard deviation above the mean was 133.2 percent more likely to change its name, which is consistent with Hypothesis 1. In addition, firms that changed their names had shorter track records than the base group. This result suggests that a firm that has established a reputation over many years will be less likely to change its name or exit the market, all else equal. Specifically, a firm one standard deviation older than the average firm was 11.4 percent less likely to change its name, which is consistent with Hypothesis 2. Moreover, firms that advertised more extensively

[14] In estimation, the base outcome is maintaining the *status quo*.

Table 6—A Multinomial Probit Regression Where the Choices for a Firm are not Changing Its Name and Not Exiting (Base Outcome), Exiting, and Changing Its Name between 2008 and 2009

	Equation 1: Name change			Equation 2: Exit		
	(1)	(2)	(3)	(1)	(2)	(3)
Complaints	0.288***	0.502***	0.812***	0.086*	−0.012	0.439
	(0.042)	(0.109)	(0.186)	(0.051)	(0.203)	(0.298)
Firm age	−0.065**	−0.083**	−0.085**	−0.155***	−0.145***	−0.154***
	(0.032)	(0.034)	(0.035)	(0.029)	(0.031)	(0.031)
Employees	0.010	0.004	0.004	0.000	−0.002	−0.002
	(0.007)	(0.012)	(0.012)	(0.008)	(0.011)	(0.011)
Ad spending	0.025*	0.005	0.017	−0.004	−0.001	−0.050
	(0.015)	(0.017)	(0.024)	(0.016)	(0.017)	(0.035)
Metro Chicago	0.489***	0.253	0.354	0.212**	0.307*	0.138
	(0.124)	(0.216)	(0.242)	(0.106)	(0.171)	(0.190)
Complaints^2	−0.006***	−0.005***	−0.005***	−0.002	−0.002	−0.002
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Firm age^2	0.002*	0.002	0.002	0.004***	0.004***	0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Employees^2	−0.000	−0.000	−0.000	−0.000	−0.000	−0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ad spending^2	−0.000	−0.000	−0.000	0.000	−0.000	−0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Complaints × metro Chicago		−0.232**	−0.549***		0.093	−0.361
		(0.112)	(0.191)		(0.208)	(0.305)
Firm age × metro Chicago		0.024*	0.024		−0.010	0.007
		(0.014)	(0.016)		(0.012)	(0.014)
Complaints × ad spending		−0.001	−0.016**		0.000	−0.116
		(0.001)	(0.007)		(0.002)	(0.116)
Firm age × ad spending		0.002***	0.001		−0.000	0.004**
		(0.001)	(0.001)		(0.001)	(0.002)
Complaints × employees		0.000	0.000		−0.000	−0.000
		(0.001)	(0.001)		(0.003)	(0.003)
Firm age × employees		0.000	0.000		0.000	0.000
		(0.001)	(0.001)		(0.001)	(0.001)
Ad spending × metro Chicago			−0.020			0.062*
			(0.022)			(0.036)
Complaints × ad spending × Chicago			0.015**			0.117
			(0.007)			(0.116)
Firm age × ad spending × Chicago			0.000			−0.005***
			(0.001)			(0.002)
Constant	−2.068***	−1.790***	−1.862***	−0.786***	−0.854***	−0.743***
	(0.185)	(0.227)	(0.245)	(0.151)	(0.185)	(0.194)
Observations	2,293	2,293	2,293	2,293	2,293	2,293
LL	−1346.8064	−1334.9854	−1326.1957	−1346.8064	−1334.9854	−1326.1957

Note: Standard errors in parentheses.
***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

were more likely to change their names than exit: a firm that spent one standard deviation more on advertising than the average firm was 17.8 percent more likely to change its name than exit. Finally, firms outside metro Chicago were 48.5 percent less likely to change their names than firms within metro Chicago, all else equal, which is consistent with Hypothesis 3.

Note also the significant non-linearity in the key variables of interest, complaints and tenure. Including quadratic terms for the explanatory variables improves the fit of the model, increasing the log-likelihood from −1375.6 to −1346.8, though the qualitative interpretation of the results remains similar. The economic justification for including quadratic terms is that the first few complaints filed against a firm have a substantial effect on its reputation, while the incremental effect diminishes gradually for each additional complaint.[15]

To understand how the number of failures and the track record associated with a firm interact with the other explanatory variables, the next regression, reported in column 2 of Table 6, considers the same multinomial probit specification as above, but includes additional interaction terms of interest. The results from this estimation provide evidence in support of Hypothesis 4: firms outside metro Chicago that received more complaints were more likely to change their names, while those that had longer track records were less likely. This result corresponds with the intuition that rural businesses rely relatively more on referrals and repeat customers, and thus firms in smaller markets potentially benefit more from remaining "recognizable" by their past customers. Once a firm in a small market establishes a reputation for poor performance, however, it must conceal its past history or exit because the entire market recognizes that the firm should command a low wage, if it is transacted with at all.

The results conform with this contention, as complaints had a significantly stronger effect in smaller markets: a firm with one standard deviation more complaints than the average firm outside metro Chicago was 144.3 percent more likely to change its name or exit, compared with only 62.9 percent for firms within metro Chicago. Moreover, an established track record had a greater effect outside metro Chicago: a firm one standard deviation older than the average firm outside metro Chicago was 16.4 percent less likely to change its name or exit, while those within metro Chicago were 5.5 percent less likely. Put simply, the reputation mechanism had considerably more "bite" in the smaller markets, as suggested by Hypothesis 4.

The other statistically significant coefficient of interest in column 2 is the interaction between *Ad Spending* and *Firm Age*, which can be explained by the advertisement placement policies of the Yellow Pages. Because a firm that has advertised for many years will have its advertisements placed nearer the beginning of its category, as discussed in Section III, it will have a lower effective cost for adding a name (e.g., a firm can choose to allocate its best advertising position to a new name to attract customers). And, naturally, a firm that faces a lower cost for adding a name will be more likely to add one, all else equal. In addition, because an advertisement's position in the Yellow Pages depends on the amount a firm has spent on advertising in the past, its stock of past advertising expenditures represents a valuable "advertising option" for the firm. Firms with more valuable advertising options will thus be less likely to exit the market, all else equal, as they have larger continuation values.

This effect, however, will differ for firms inside and outside metro Chicago. Because metro Chicago is a crowded market with over 1,400 firms serving the area,

[15] This is similar to the finding in Cabral and Hortacsu (2010) that an eBay seller's first negative review has a disproportionally large effect on his reputation.

firms find it difficult to attract attention with their listings in the Yellow Pages. As such, having a better position in the advertising section will be more valuable in metro Chicago than in a small market, all else equal, and firms' actions should reflect this difference.

As shown in column 3 of Table 6, firms that advertised relatively more in the Yellow Pages and operated exclusively outside metro Chicago were more responsive to changes in their reputations than firms within metro Chicago. In metro Chicago, older firms that had invested more in advertising were less likely to exit: a one standard deviation increase in both a firm's age and advertising expenditures reduces the likelihood that the firm will exit by 57.5 percent if it served metro Chicago, compared with 40.5 percent for firms outside metro Chicago. Moreover, firms in metro Chicago that had advertising expenditures and tenures one standard deviation above their means were 4.4 times more likely to change their names than exit, whereas firms outside metro Chicago at these levels were only 2.4 times more likely. These results suggest that the option value of receiving a favorable ad placement in the Yellow Pages was more valuable for firms in metro Chicago, and this had different implications for firms' decisions to change their names or exit in each market. While having more valuable continuation values in terms of better advertising options was associated with a greater likelihood of remaining in the market both within and outside metro Chicago, as predicted by Hypothesis 5, the effect was stronger among metro-area firms, an intuitively pleasing result given that a better position in the Yellow Pages is more valuable in a more-crowded market, all else equal.

Ignoring the distinction between firms that change their names and those that exit obscures an important inference in this case. Pooling both groups of firms together for the estimation presented in Table 5 suggests that advertising expenditures are (weakly) positively correlated with a firm's decision to change its name or exit the market. In a dataset that does not distinguish between name changes and exits, this result would give rise to the misleading conclusion that firms that spend more on advertising are more likely to exit, whereas ad spending is actually positively correlated with a firm's decision to remain in the market, either under its past name or with a new name. Thus, empirical settings that cannot distinguish between name changes and exits do not fully capture these nuances of firm behavior.

Robustness.—While a longer panel of observations would facilitate controlling for persistent, unobserved heterogeneity among firms to identify the effects of reputation on name choices more precisely, data limitations do not allow for this. As it stands, however, the current dataset does allow for several supporting estimations that test whether the patterns observed in the data are robust to alternative explanations.

Notably, theory predicts that (i) firms will only drop names with bad records and (ii) only firms with bad records will add names. Using data on name changes between 2008 and 2009, a natural test of (i) would be a regression in which the dependent variable equals one if the firm dropped a name and zero otherwise, and a natural test of (ii) would be a regression in which the dependent variable equals one if the firm added a name and zero otherwise. But because name drops constitute

Table 7—A Probit Regression Where the Dependent Variable is Equal to 1 if a Firm Drops a Name in 2009, and 0 Otherwise

Variable	Coefficient	(Standard error)	Marg. eff.	(Standard error)
Complaints	0.2120***	(0.0307)	0.0260***	(0.0039)
Firm age	−0.0079	(0.0240)	−0.0010	(0.0029)
Employees	0.0085*	(0.0051)	0.0010*	(0.0006)
Ad spending	0.0250**	(0.0114)	0.0031**	(0.0014)
Metro Chicago	0.3227***	(0.0935)	0.0375***	(0.0101)
Complaints^2	−0.0048***	(0.0010)	−0.0006***	(0.0001)
Firm age^2	0.0004	(0.0010)	0.0000	(0.0001)
Employees^2	−0.0000	(0.0000)	−0.0000	(0.0000)
Ad spending^2	−0.0005*	(0.0003)	−0.0001*	(0.0000)
Intercept	−1.8807***	(0.1422)		
Observations		2,293		
Log-likelihood		−548.933		
$\chi^2_{(9)}$		103.70		

***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

most of the name changes between 2008 and 2009, testing (i) directly is feasible, while testing (ii) directly is not.

Table 7 presents the results for the suggested test of (i). As predicted, firms that received more complaints were more likely to drop a name. Holding all else fixed, a firm with a record of complaints one standard deviation above the mean in 2008 was 10.8 percent more likely to drop a name in 2009.

While result (ii) is not directly testable using the current data, the corresponding implication that firms have multiple names only if they have bad records is testable with a regression in which the dependent variable equals one if the firm has multiple names, and zero otherwise; this regression will determine whether firms with more complaints are more likely to have multiple names. As shown in Table 8, having more complaints is associated with having multiple names in the cross section. Holding all else fixed, a firm with a record of complaints one standard deviation above the mean in 2008 was 16.1 percent more likely to use more than one name.

Finally, recall the implication of Hypothesis 2, that a negative correlation will exist between a firm's age and the number of complaints associated with it. To verify this relationship, Table 9 presents the results from a count regression in which the dependent variable is the number of complaints filed against a firm in 2008. As predicted, a firm's tenure is correlated with having fewer complaints. For instance, the average fifteen-year-old firm has 33.8 percent fewer complaints than the average five-year-old firm, all else equal. This result suggests that a bad seller will not continue to operate with his name and its associated track record. Rather, firms will discontinue names with poor associated reputations over time and only names with good associated track records will survive, resulting in the observable correlation between a firm's age and complaints. It also suggests that retiring sellers do not fall prey to moral hazard, on average, which would occur if sellers had no incentive to maintain their reputations as they neared retirement because they had no mechanism for selling their names.

Table 8—A Probit Regression Where the Dependent Variable is Equal to 1 if a Firm Uses More Than One Name in 2008, and 0 Otherwise

Variable	Coefficient	(Standard error)	Marg. eff.	(Standard error)
Complaints	0.33715***	(0.03479)	0.04987***	(0.00560)
Firm age	0.00427	(0.02250)	0.00063	(0.00333)
Employees	0.01409**	(0.00561)	0.00208**	(0.00082)
Ad spending	0.03624***	(0.01077)	0.00536***	(0.00159)
Metro Chicago	0.38839***	(0.08849)	0.05413***	(0.01143)
Complaints^2	−0.00694***	(0.00105)	−0.00103***	(0.00016)
Firm age^2	−0.00006	(0.00079)	−0.00000	(0.00012)
Employees^2	−0.00009*	(0.00005)	−0.00001*	(0.00000)
Ad spending^2	−0.00066***	(0.00025)	−0.00010***	(0.00004)
Intercept	−1.92194***	(0.3547)		
Observations		2,293		
Log-likelihood		−627.911		
$\chi^2_{(9)}$		229.29		

***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

Table 9—A Negative Binomial Regression Where the Dependent Variable is the Number of Complaints Filed against a Firm with the BBB in 2008

Variable	Coefficient	(Standard error)	IRR	(Standard error)
Firm age	−0.1027**	(0.0504)	0.9024**	(0.0455)
Employees	0.0411***	(0.0122)	1.0419***	(0.0127)
Ad spending	0.0651***	(0.0243)	1.0673***	(0.0259)
Metro Chicago	1.1440***	(0.1914)	3.1393***	(0.6009)
Firm age^2	0.0031*	(0.0018)	1.0031*	(0.0018)
Employees^2	−0.0001***	(0.0000)	0.9999***	(0.0000)
Ad spending^2	−0.0003	(0.0005)	0.9997	(0.0005)
Intercept	2.3331***	(0.2922)		
Observations		2,293		
Log-likelihood		−1162.739		
$\chi^2_{(7)}$		180.92		

***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

V. Conclusion

This paper confirms a main equilibrium prediction of the literature on firm reputation: poor past performance reduces the value of a firm's name, and a firm will change its name to start with a clean record, or reputation, once the value falls far enough. Plumbing firms that receive more complaints are more likely to change their names or exit the market, while firms that have longer track records are less likely.

In addition, this paper shows that ignoring the distinction between firms that actually exit the market and those that change their names can obscure important effects. The consumer welfare implications of not distinguishing between actual exits and mere name changes in this setting are potentially stark, as the former would serve to purge the market of bad sellers, while the latter would act only to pool experienced bad types with inexperienced good types, resulting in a negative spillover from bad types to good in the form of lower wages for all sellers with nascent transaction histories.

An immediately apparent method for preventing this behavior is to make it more onerous for firms to change or add names. In practice, the relative ease with which firms can conceal their reputations has serious consequences for consumers. For instance, a recent investigation by the United States Government Accountability Office found that at least 9 percent of motor coach carriers that were ordered "out of service" by the Federal Motor Carrier Safety Administration for violating safety standards simply "reincarnated" themselves with new names, which undermines the effectiveness of regulations and consumers' searches for safe and reliable service providers.[16]

Finally, this paper offers the first empirical test of the theoretical literature on name changes in a "bricks and mortar" setting, which relates to the broad phenomenon of major corporations rebranding themselves following notorious failures or bad publicity, such as ValuJet to AirTran, GMAC Bank to Ally Bank, and Philip Morris to Altria, to cite just a few.

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[16] cf. GAO Report to Congressional Requesters, "Motor Carrier Safety: Reincarnating Commercial Vehicle Companies Pose Safety Threat to Motoring Public; Federal Safety Agency Has Initiated Efforts to Prevent Future Occurrences," July, 2009.