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What's in a Name? Reputation as a Tradeable Asset

By STEVEN TADELIS*

I develop a model in which a firm's only asset is its name, which summarizes its reputation, and study the forces that cause names to be valuable, tradeable assets. An adverse selection model in which shifts of ownership are not observable guarantees an active market for names with either finite or infinite horizons. No equilibrium exists in which only good types buy good names. The reputational dynamics that emerge from the model are more realistic than those in standard game-theoretic reputation models, and suggest that adverse selection plays a crucial role in understanding firm reputation. (*JEL* C70, D80, L14)

Our names are labels, plainly printed on
the bottled essence of our past behavior.
"Afterthoughts"[1] by Logan P. Smith

What is a name? It is exactly the label that summarizes the physical attributes, past behavior, and other characteristics of the carrier of the name. In our language-based society this is our way of representing a large amount of information in a word or two. We label anything we can perceive or recognize with a unique name in order to distinguish it from everything else in our world. This is also true for firms: Once a firm is established, it is recognized by its name, which is uniquely associated with its characteristics and past performance.

Some recent theories of the firm are devoted to investigating the consequences of asset ownership, and deal with well-defined tangible assets that can be bought and sold (see, e.g., Oliver Hart, 1995). It is well known, however, that many firms have *intangible* assets, one of the more important of which is the firm's name, or actually the reputation conveyed by its name.[2] This paper concentrates on the firm as a *bearer of reputation* (see David Kreps, 1990; Paul Milgrom and John Roberts, 1992 pp. 331–32) and attempts to answer two theoretical questions. First, what forces can turn names into valuable, tradeable assets; and second, what reputational effects characterize the market for names?

An attempt to develop a theory of the firm as a bearer of reputation was first made by Kreps (1990). He gives a simple example that demonstrates, using the ideas of the folk theorem in repeated games, how reputation can become a tradeable asset. However, as Kreps himself admits, there are problems with his theory. First, as is common with repeated-game models of reputation, the theory is weak because of multiple equilibria. There are many equilibria in Kreps's model in which the firm is not bought, its name has no value, and thus no intangible asset is preserved. Furthermore, the forces that

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[1] I have borrowed this quotation from Charles J. Fombrum (1996).

[2] A firm's intangible assets are usually hidden in its balance sheet, and their value is calculated only when the firm is sold, by subtracting the value of the tangible net assets from the firm's sale price. This "goodwill," as accountants refer to it, is meant to capture the value of these intangibles, including the firm's reputation. In fact, between 1980 and 1990, the value of intangible assets in the United States increased nearly tenfold from $45 billion to an estimated $400 billion. (See Fombrun, 1996 p. 86.)

should lead the economy to the equilibrium in which names are valuable are not determined. Second, the horizon must be infinite. One can change the model to a finite-horizon repeated game with incomplete information (as Kreps suggests), but this will still require that the horizon be "long enough" for there to be a value of maintaining a reputation.[3] In contrast, this paper focuses on the issue of name trading, and presents a model in which names are traded in all equilibria, a result that is robust to very short horizons (in fact, two periods are enough).

Aside from the two theoretical concerns mentioned above, two problems are apparent in practical applications of Kreps's model. First, there is no account of how a firm's reputation, represented by its name, may increase (or decrease) in value as is commonly observed in reality. Second, the theory offers no role for such common practices as name changes and announcements of "new ownership." This paper offers an appealing and realistic role for such practices. Furthermore, the dynamics of changes in the value of names have a simple and appealing economic interpretation.

As in Kreps's story, my model has suppliers and buyers of a service, and the *only* asset a firm has is its name. Thus, selling the firm's name amounts to selling its reputation. Yet, unlike the standard game-theoretic models that deal with reputation, the model presented here is one of adverse selection (or hidden information) alone; agents do not have a choice of actions that might affect their reputation.[4] This omission allows me to abstract from the problems created by the "end game" effects of shirking which can only be remedied by very long horizons. I will later argue that adding moral hazard should not change the qualitative results and insights this paper offers.[5]

The model also departs from standard economic theory in its central assumption that transactions carried out in the market for names (shifts of ownership) are hidden from potential clients of these firms. That is, when a client decides to use a firm's service, she does not know if the agent who currently owns and runs the firm is himself responsible for the firm's past performance. This extreme assumption tries to capture the more realistic idea that not all buyers know who owns and runs the firms they buy from, and some realistic ways to weaken it are discussed in Section 2. In addition to allowing agents behind names to change unnoticed, I will also allow agents to change their firm's name secretly. This feature of the model is not necessary for the main results to hold, but allowing it may shed light on the decision to discontinue a (brand) name. Due to the natural way in which beliefs are updated in the dynamic equilibria of my model, poor past performance will cause a firm's name to lose value. Once the value falls enough, it will be worthwhile to discontinue the firm's name and start with a "clean" record, taking advantage of the ignorance of consumers as to who exactly is behind the different names.

To illustrate this point, first consider the case of ValuJet Airlines. After the unfortunate crash of Flight 592 in 1996, ValuJet was struggling to win over customers who decided to take their business elsewhere. A repeated-game framework of reputation would imply that potential clients are punishing ValuJet for not delivering the "equilibrium" standard of service. The model proposed here suggests that they are rather updating their beliefs about the ability of ValuJet's managers and employees to provide them with adequately safe flight service. It might just be that the very recent merger between AirTran Airways and ValuJet, Inc., is a corporate response to these unfavorable beliefs. In fact, as suggested by the model, the name ValuJet will be replaced and the newly created

[3] When the degree of incomplete information goes to zero, the necessary length of the game needed to support these reputational equilibria goes to infinity (see Kreps et al., 1982). Also, the problem of multiple equilibria still persists (see Drew Fudenberg and Eric Maskin, 1986).

[4] See Fudenberg and Jean Tirole (1990 Ch. 9) for a summary of the standard game-theoretic models. Examples of other reputational models which have both adverse selection and possible actions are Douglas W. Diamond (1989), Tirole (1996), and George J. Mailath and Larry Samuelson (1998a).

[5] The abstraction from moral hazard can be thought of as an agent who first invests in training, which in turn determines his "type" for the rest of his career. A model of exogenous costs of skill acquisition is likely to have adverse selection emerging from a moral hazard setup.

holding company will operate as AirTran Holdings, Inc. The Columbia/HCA Healthcare company recently made a similar decision—in December of 1997 many hospitals in north Texas decided to drop the Columbia name in an effort to distance themselves from the company's nationwide troubles associated with an ongoing fraud investigation. In the *Dallas Morning News* of December 5, 1997, Mr. Dean Massey, director of marketing for the Medical Center of McKinney, is quoted as saying that, "Having a name change is not that major an alteration because we've gone through name changes before." This fact is congruent with the assumption of the model that name changes are costless for most firms. Another recent example is the decision of Woolworth shareholders to adopt Venator as the company's new name, hoping to shed the company's "five-and-dime" image. The existing reputation literature offers no explanation for these phenomena.

The first main result of this paper is that names must be actively traded in *all* equilibria. This result relies heavily on the nonobservability assumption of ownership shifts that is the source of value for names in my model. If names were not traded, a good past would generate expectations of good future performance. Thus, if a new agent can secretly buy a name with a good history that creates expectations of good future performance, he will earn more revenue than he would with a new name. In equilibrium, clients are aware of this trade and update their expectations accordingly, but nonetheless names retain some value and are actively traded.

The second result is that there cannot be an equilibrium in which good agents fully separate themselves from the population by buying good names; every equilibrium must have some bad types buying names as well. Here the paper sheds light on an effect that has so far been ignored. In Kreps's model, people will buy a good name only if they intend to maintain it. Translated into an adverse selection framework, this result means that good types value good names more than bad types because it is easier for them to maintain the name. I call this the "Reputation Maintenance Effect." Another effect, however, is present: it is easier for good types to build their own name, so they value an existing good name less than bad types who cannot easily build a name for themselves. I call this the "Reputation Start-up Effect." It is shown that if only good types buy names then market expectations cause the start-up effect to overcome the maintenance effect, which in turn causes bad types to value names more than good types do. Note that neither the first nor second main results have any welfare implications. This paper presents a novel approach at understanding reputation in firms and is a first step in this direction. Welfare analysis is left for future research.

As a motivating example, throughout the paper I will focus on the restaurant industry. It is well known that new, unknown restaurants can become either major attractions or complete flops, the latter usually either ending in being closed down or being replaced by another (sometimes operated by the same owner, i.e., a *name change*). Most patrons refer to lagged information about the performance of restaurants, and use reputation as an indicator of expected performance without checking whether major changes occurred (such as replacement of the chef/owner). I will later argue that the model presented in the paper fits this industry quite well, and in fact offers an appealing explanation to the dynamics of restaurants' reputations. I will also argue that the conclusions of the stylized model can be extended to fit larger and more complex organizations.

The paper is organized as follows: Section I describes the model. Section II establishes the first main result that trade of names will occur in all equilibria, while the second main result on the composition of name buyers is presented in Section III. Section IV offers some concluding remarks and directions for future research.

I. The Economy

Consider a simple model of economic activity where in each period a client (or buyer of a service) employs an agent (or seller of a service) for that period only. The model is one of adverse selection in which there are different types of agents who differ by the probability of succeeding at their assigned task (e.g., delivering a "quality" good). It is assumed that there is a continuum of clients and agents, and the price of supplying a service is determined competitively. To simplify, assume that the clients are on the long side of the market. That is, the measure of the continuum of clients is larger than that of the agents so that competition causes each client to pay her full surplus when transacting with an agent.[6] This also implies that there will be full employment of the agents in the economy.

As is common in the adverse selection literature [see, e.g., George A. Akerlof (1970) or Bengt Holmström (1999)] and in the incomplete contracts literature (see, e.g., Hart, 1995) the following assumption is made.

ASSUMPTION 1: *Compensation cannot be based on the transaction's outcome.*

That is, problems of verifiability prevent the parties from writing outcome-contingent contracts because courts cannot distinguish success from failure. Assumption 1 implies that each client who employs an agent will pay up front for the expected value of the service supplied. For simplicity assume that all clients value success equally, as they do failure: If the outcome is successful it yields a return of 1, while if failure occurs it yields a return of 0.

Each agent runs his own firm, which is represented by a *name,* and it is assumed that no two firms can share the same name. An agent, at the beginning of his lifetime, has two choices: He can either *choose* a name to represent his firm, which implies that he will have no initial track record, or he can *buy* a name from an agent who is about to exit the active economy, inheriting the track record associated with that name. It will become clear later how the expected value of a firm's service is determined by the perfect observation of that firm's past performance. There is some tension between the assumptions that on one hand performance is not contractible (Assumption 1) and on the other hand track records are perfectly observable (a standard assumption in the incomplete contracting literature). To justify this assumption, consider the idea of a higher *standard of proof* needed in court to justify conviction. Perhaps judges or juries can detect a violation or misperformance, but proving this beyond reasonable doubt is much harder. Another justification would be that different clients might judge performance differently. For example, a meal that might be too hot and spicy for one client would be delicious for another. Thus, verifying an outcome may require resorting to many opinions, which may be quite costly.[7]

It is common in economic theory to assume that all transactions that take place in the market are readily observable to all. I claim this is not true in reality, at least not entirely. Consider, for example, a restaurant you enjoyed going to. It might have been recommended by a critic or a friend; in this indirect way you have "observed" the restaurant's past performance. Now, before going to the restaurant, will you check whether the chef/owner is the same person responsible for the critic's review or for your friend's satisfying experience? I believe the answer is no: It is not true that shifts of ownership are readily observable by all clients. Of course, at some cost almost everything is observable, but to make my point I will consider the extreme case of infinite costs of observation.

ASSUMPTION 2: *Shifts of name ownership are not observed by the clients.*

Assumption 2 implies that when a client employs an agent who has a name with a history, she cannot determine whether the agent himself is responsible for that history or whether he has just bought it. This extreme assumption can be easily weakened. For example, if only a proportion of the population does not observe shifts of ownership then the qualitative results of the paper will continue to hold. The analysis, however, becomes more cumbersome without contributing to our understanding of the driving forces.[8] Thus, in the

[6] Any generic division of surplus will guarantee the results that follow, implying their robustness to this simplification. The other extreme (nongeneric) case where clients get all the surplus, causes agents to be indifferent, and thus no transactions need to take place in the market for names.

[7] Note that perfectly observable histories are not necessary. It would suffice to have a well-defined summary statistic to drive the results of this paper. This would relax the tension described above.

[8] Another way to weaken the assumption would be with a positive cost of observing shifts of ownership, distributed randomly across clients so that some clients find it too

eyes of the clients, the firm is represented only by its name, and the actual agent or group of agents who produce the good and own the firm are unknown.[9] Assumption 2 is significant because the impact of the current owner on the firm's past performance is uncertain. Following Assumption 2, it would be natural to assume that clients cannot observe when agents change their firm's name. More precisely, Assumption 3 follows.

ASSUMPTION 3: *At the beginning of each period every active agent can either choose to retain his past name or unobservably change it.*

Assumption 3 says that as long as an agent retains his name, the history of his past performance and of any other agents under this name is perfectly observable. However, once the agent chooses a new name, then the past record of this agent is erased and he can just as well be an agent that has now arrived into the economy with a clean record.[10] The symmetry between Assumptions 2 and 3 is apparent. Indeed, one can argue that if non-observability is assumed then it should hold for *any* shift of people behind names, be it via trade or due to a cosmetic change of name. Some people manage to hide their unlucky past by shifting from one area to another. In particular, many restaurant owners fail before they manage to establish a good restaurant. Moreover, their bad history will not necessarily follow them when they switch the restaurant they own and run. In a different context it has been observed that name changing is common practice among firms and it affects the stock prices in a positive way which is consistent with the model presented here. In a world with perfect observability such a cosmetic change should have no effect on the value of a firm.[11]

A final assumption is made regarding the process of changing one's name. Clearly, changing a name requires some ingenuity—otherwise one can be revealed as a failure who tried to erase his past. This assumption can be naturally captured by some distribution of the costs of changing names across the agents. If this distribution has enough support (some agents are clumsy enough) then these costs can be captured by the following "reduced form" assumption.

ASSUMPTION 4: *An arbitrary proportion $\varepsilon > 0$ of agents cannot change their name, and all other agents can costlessly change their name.*

As I will demonstrate later, this assumption is needed to weed out some "unreasonable belief" equilibria that can arise when all agents can change their name costlessly, and no names are traded. Though Assumptions 3 and 4 are somewhat ad hoc, they are intended as a stark depiction of a more realistic process of name changing. It is important to note that if both Assumptions 3 and 4 are dropped (i.e., histories are completely "sticky") then all the results in the paper will carry through (see Tadelis, 1999).

The adverse selection is captured by the existence of two types of agents: "good" agents, or G-types, in proportion γ, and "bad" agents, or B-types, in proportion $1 - \gamma$. G-types succeed with probability $P_G \in (0,1)$, and B-types succeed with probability $P_B < P_G$. Without loss of generality assume that $P_B = 0$.[12] Assume also that agents are active in the economy for two

costly to identify shifts in ownership. This is analogous to a probabilistic observation of shifts of ownership.

[9] I believe that the idea of reputation as an asset has significance in supporting the formation of partnerships, where reputation will be the "glue" that keeps partners together, and alleviates the problems of free-riding and shirking. This is left for future research.

[10] An agent can also abandon his name and buy a name from another agent. In all equilibria it turns out that agents who wish to abandon their past are indifferent between choosing a new name or buying a name. Therefore, I will assume that agents who wish to erase their past in midlife will just choose a new name.

[11] See Dan Horsky and Patrick Swyngedouw (1987), who show that name changes are associated with improved performance. It seems plausible to argue that if all clients observe this name change then there should be no changes in expectations. However, if some clients do not observe this change, and will therefore ignore past poor performance, then the informed agents in the economy should form expectations of higher stock prices.

[12] It might seem that this assumption may have strong effects. However, as will become clear from the analysis, having $P_B > 0$ will not change the qualitative results. It will also become clear from the analysis that having more than two types will not change the qualitative results of the paper. For an analysis with a continuum of types, see Tadelis (1999).

periods, after which they leave the active economy for "retirement." Agents enter and exit the economy in an overlapping-generations (OLG) fashion, in which the total size of the population, and the distribution of types of agents, is constant over time. In contrast, clients live for only one period and can observe the firms' (names') track records for assessment of their types. Furthermore, clients are anonymous and cannot contract among themselves.[13] The time line of each period is presented in Figure 1.

II. Names as Tradeable Assets

This section describes the forces causing names to be traded in equilibrium, and investigates some characteristics of the market for names. Since an OLG model is employed, it would be natural to follow the standard OLG literature and analyze the steady states of this economy. However, it is well known from the macroeconomic literature on the value of money that many features of equilibria in the steady state would unravel and break down in a finite-horizon model. For this reason I begin by investigating a finite version of the OLG model to show that the results of this paper are independent of the length of the economy's horizon, as long as the flavor of overlapping generations is maintained. To see this in the most transparent way I will start with a two-period model.

Consider a two-period model in which the size of the population of agents is constant and the features of an OLG model are still captured. To accomplish this, one generation of agents lives in both periods, while two other generations will live in only one period. Furthermore, the size of these one period generations are equal to the size of the two-period generation. Thus, this economy will always consist of a proportion γ of G-types and a proportion $1 - \gamma$ of B-types as described in Section I above. To simplify notation assume that each generation of agents is of measure 1, so that the total measure of agents is 2. This convention will be adopted throughout the paper. The time line of this two-period economy is described in Figure 2.

At date $t = 0$ the economy starts with agents from generations 0 and 1 choosing names for their firms, and then clients paying firms up front for their services. Clearly, given that no prior information is available to the clients, they will pay the same price to all firms, which equals the expected benefit from hiring a firm's service,

$$w_0 = \gamma[P_G \cdot 1 + (1 - P_G) \cdot 0] + (1 - \gamma) \cdot 0$$
$$= \gamma P_G.$$

This follows because only G-types (in proportion γ) will succeed with probability P_G, the client's value from success is 1, and her value from failure is 0.

At date $t = 1$ the analysis is less straightforward. When a client decides to hire a firm there will be two kinds of firms: some firms will have a past history while others will not. In turn, firms with a past history of success will fall into two categories: they can either be operated by a good type who succeeded and lived on to the second period (recall that $P_B = 0$), or by a new agent who bought the name from a good agent who retired. An equilibrium of the two-period economy will be characterized by two markets at $t = 1$: those for the service of firms with different track records and those for names with different track records. Before proceeding with the two-period model, I will introduce additional notation: Since only past histories matter, then two distinct names with the same history should generate the same expectations for future success at $t = 1$. For this reason let S denote any name at $t = 1$ with a past success, F with a past failure, and θ a name with no past. The equilibrium prices that firms charge for their services at $t = 1$ will be denoted by $w_1(h)$, $h \in \{S, F, \theta\}$, and the equilibrium prices of names at $t = 1$ will be denoted $v(S)$ and $v(F)$, respectively. Also, let $\Pr\{G|h\}$ denote the conditional

[13] The reason clients need to disappear is to prevent long-term contracts between individual clients and agents which can eliminate some of the adverse selection. Also, clients need to be anonymous so that "old" clients cannot inform "new" ones of the agents behind the names. However, even if clients can use renewal contracts, then as long as some new clients cannot observe these relationships then the results of the paper will hold.

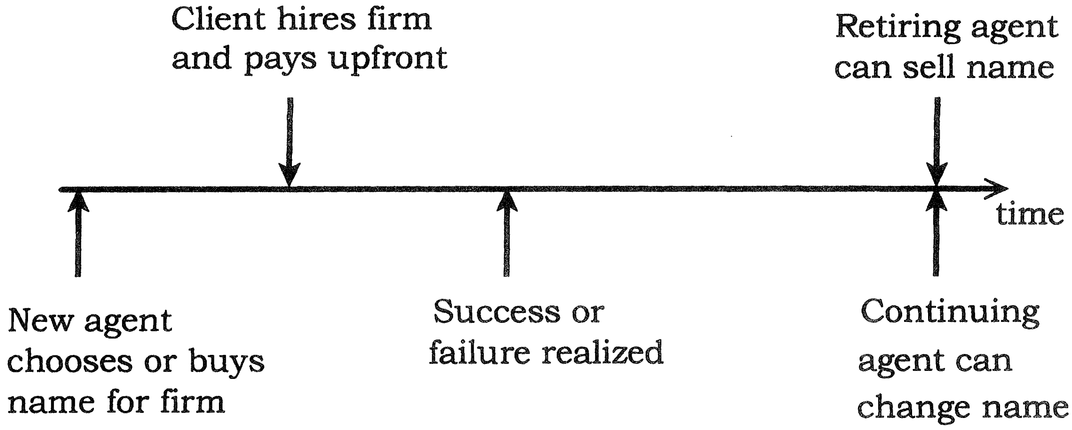

FIGURE 1. THE TIME LINE FOR EACH PERIOD

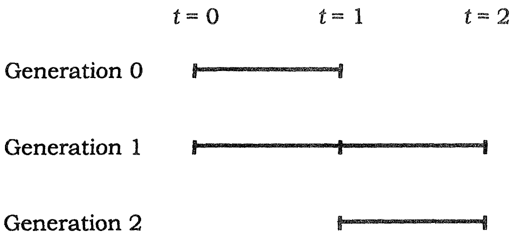

FIGURE 2. A TWO-PERIOD ECONOMY

probability of a firm's agent being a G-type when its history is $h \in \{S, F, \theta\}$. The first main result of the paper can now be established.

PROPOSITION 1: *S names will be traded in all equilibria.*

PROOF:

Assume in negation that there exists an equilibrium in which no names are traded at $t = 1$. This implies that the value of a name with a past success must be zero since the supply of S names is positive and is equal to the measure γP_G (the good types of generation 0 exit the economy, of which a proportion P_G succeeded). Since $P_B = 0$, it must be that $\Pr\{G|S\} = 1$, and since $1 - \gamma > 0$ it is always true that $\Pr\{G|\theta\} < 1$. This implies that $w_1(S) > w_1(\theta)$, which in turn implies that any agent who has no past will be willing to pay a positive price for a S name, a contradiction. This completes the proof of Proposition 1.[14]

This result is driven by the nature of adverse selection and by Assumptions 2 and 4. (Note that if $0 < P_B < P_G$ then the critical part of the proof, that Bayesian updating implies $w_1(S) > w_1(\theta)$ under no trade, continues to hold and the result follows.) With full observability of ownership shifts this result is no longer true—assigning beliefs to clients saying that only bad types buy names will support equilibria with no trade of names. This intuition illuminates a central point of this paper: nonobservability of ownership shifts is a necessary condition for the market for names to be active in all equilibria.[15]

[14] Assumption 4 guarantees that $\Pr\{G|S\} = 1$ when no names are traded. This assumption helps rule out "unreasonable" equilibria of the following form: All agents attempt to abandon their name after the first period, and in the second period clients believe that a firm with *any* history is worse than the average firm with no track record. Since a proportion ε of the agents will not be able to abandon their name, these beliefs cannot be sustained in equilibrium for the following reason: No new agent would choose to buy any name, and all agents would attempt to lose their name. But, a proportion ε of the population will have their name stick to them, which in turn implies by Bayes' rule that $\Pr\{G|S\} = 1$.

[15] Note that with symmetric uncertainty in which the agents do not know their types (as in Holmström, 1999), Proposition 1 will still hold. The intuition is exactly the same.

The intuition of Proposition 1 applies quite nicely to the restaurant story. If both shifts of ownership and name changing are not easily observed then a retiring chef/owner of an established restaurant should find many potential buyers for it. Furthermore, no such buyer would be foolish enough to publicly announce "under new management," an act that could only lower the expectations of enthusiastic clients. On the other hand, the owner of a restaurant that offered poor service would be tempted to put up such a sign in the hope of tempting disappointed clients from the past. This issue is further discussed in Section IV.

The rest of this section characterizes equilibria for the two-period model. Note that the economy ending at $t = 2$ has two effects: First, both new good and bad types from generation 2 will have the same benefit from buying a name. Second, agents from generation 1 who failed can change their names and thus will value an S name exactly as new agents will. This yields the following result which is proved in the Appendix.

LEMMA 1: *In any equilibrium, new agents and agents who failed and continue will be indifferent between buying a S name and not buying one.*

In the characterization of equilibria below I assume that F names will not be traded.[16] This immediately implies that all agents who fail in their first period will try to change their name in order not to generate below-average expectations [recall that from Assumption 4 that only $(1 - \varepsilon)$ of these agents will be able to change their name]. Also, since "old" agents will be indifferent between buying names (after erasing their past) and just erasing their past and starting fresh, I will also assume that S names are only bought by new agents. (This does not change the qualitative results but may be relevant for the division of surplus.)

[16] Proposition 1 establishes that S names need to be traded, and in Proposition 2 equilibria are characterized in which no F names are traded. One can construct equilibria in which F names are traded at positive prices, but a reasonable belief restriction rules this out. See Tadelis (1999) for a more detailed account of this issue.

In any (rational-expectations) equilibrium clients must have correct beliefs about the composition of new good and bad types who buy names at $t = 1$. Let δ (respectively ρ) denote the proportion of new good (respectively bad) types who buy S names at $t = 1$. In equilibrium δ and ρ must satisfy the market-clearing condition which guarantees that the supply of S names is equal to the demand,

$$(1) \qquad \gamma P_G = \delta\gamma + \rho(1 - \gamma).$$

Recall that clients will pay their full expected surplus up front, so in equilibrium it must be that for all h, $w_1(h) = \Pr\{\text{success}|h\} = \Pr\{G|h\} \cdot P_G$. Given δ and ρ that satisfy (1) above, the probabilities are determined by Bayes' rule as follows:

$$(2) \qquad \Pr\{G|S\} = \frac{\gamma P_G + \delta\gamma}{\gamma P_G + \delta\gamma + \rho(1 - \gamma)} = \frac{P_G + \delta}{2P_G},$$

and

$$(3) \qquad \Pr\{G|\theta\} = \frac{\gamma(1 - \varepsilon)(1 - P_G) + (1 - \delta)\gamma}{\gamma(1 - \varepsilon)(1 - P_G) + (1 - \gamma)(1 - \varepsilon) + (1 - \delta)\gamma + (1 - \rho)(1 - \gamma)} = \frac{2\gamma - \gamma P_G - \delta\gamma - \varepsilon\gamma(1 - P_G)}{2 - 2\gamma P_G - \varepsilon(1 - \gamma)},$$

where the second equality in both equations follows from market clearing and some simple algebra. The correct beliefs about δ and ρ will determine $w_1(h)$ for all h according to Bayes' updating as described in (2) and (3) above. Also note that in equilibrium $v(S) = w_1(S) - w_1(\theta)$, which follows immediately from Lemma 1 and Proposition 1. If $v(S) < w_1(S) - w_1(\theta)$ then agents would prefer buying a S name to starting fresh, contradicting Lemma 1. If $v(S) > w_1(S) - w_1(\theta)$ then agents would strictly prefer not to buy a S name, contradicting Proposition 1. It turns out that the observations above characterize equilibria of the two-period model, and an equilibrium will be a sixtuple $\langle \delta, \rho, w_1(S), w_1(F), w_1(\theta), v(S) \rangle$. Note that the prices firms charge clients, and the prices new agents are willing to pay for names, will be generated by the correct beliefs about (δ, ρ), so that a pair (δ, ρ) will in fact uniquely determine the other equilibria parameters. For ease of calculations I will hereafter consider the limiting case where $\varepsilon = 0$, which yields [from (3) above]:

$$\Pr\{G|\theta\} = \frac{2\gamma - \gamma P_G - \delta\gamma}{2 - 2\gamma P_G}.$$

This has no qualitative affect on any of the results. The following proposition characterizes the set of equilibria in which only S names are traded and is proved in the Appendix.

PROPOSITION 2: *There exists $\delta^* < P_G$ so that (δ, ρ) is an equilibrium if and only if $\delta \in [\delta^*, P_G]$ and (δ, ρ) satisfy (1) above.*

Proposition 2 implies that there are multiple equilibria. If $\gamma < 1/2$ then $\delta^* = 0$ and $v(S) > 0$ for all $\delta \in [\delta^*, P_G]$. Intuitively, if being good is less likely than being bad, then the "worse" equilibrium in which only bad types buy S names has these names selling at a premium. If, however, $\gamma \geq 1/2$ then when $\delta = \delta^* \geq 0$ the equilibrium has $w_1(S) = w_1(\theta)$ and $v(S) = 0$. In other words, there is a "pooling" equilibrium where having a S name adds no premium above new names. Any other equilibrium $(\delta > \delta^*)$ will have some degree of separation, up to the extreme in which $\delta = P_G$ and strong separation occurs. The separation is "strong" in the sense that S names are owned only by good types, and some mixture of types own new names due to the scarcity of S names. None of the agents who failed in the first period and continue to the second will purchase names, and all of them will change their name ($\varepsilon = 0$). This, of course, implies that $\Pr\{G|S\} = 1$, and,

$$\Pr\{G|\theta\} = \frac{2\gamma - 2\gamma P_G}{2 - 2\gamma P_G} < 1.$$

The prices are determined as described earlier, $w_1(S) = P_G$, and,

$$w_1(\theta) = \frac{\gamma(1 - P_G)}{\gamma(1 - P_G) + 1 - \gamma} \cdot P_G.$$

Finally, the price of a S name must be,

$$v(S) = w_1(S) - w_1(\theta)$$

$$= \frac{1 - \gamma}{\gamma(1 - P_G) + 1 - \gamma} \cdot P_G.$$

Proposition 1, the main result of this section, demonstrates the common feature of all these equilibria: Trade of S names must *always* occur in any equilibrium. One can argue, however, that the strongly separating equilibrium in which only good types own S names is appealing, and it seems almost natural to find some way of selecting it (or equilibria close to it) from the continuum of equilibria which the model offers. This reasoning would be consistent with the theories of Klein and Leffler (1981) and of Kreps (1990), if one were to envision them in an adverse selection framework. That is, if good types find it easier to maintain a reputation, then they should be able to outbid bad types who are more likely to ruin a reputation. However, due to the indifference result of Lemma 1 it will not be possible to get such an effect in the two-period model. The characterization of equilibria is different, however, if the economy lasts for more than two periods. In fact, if only one period is added then the situation in which only good types buy S names at $t = 1$ is no longer an equilibrium. Thus the simple intuition offered above misses an important point of the reputation story which is demonstrated below.

III. Long-Term Reputational Effects

Assume now that the economy lasts for three periods as shown in Figure 3. The analysis at dates $t = 0$ and $t = 2$ in this three-period model is identical to that of dates $t = 0$ and $t = 1$, respectively, in the two-period model. Building on the notation of the previous section, let $w_t(h_t)$ denote the price at time t to a firm with history h_t, where $h_1 \in \{S, F, \theta\}$ and $h_2 \in \{\theta\theta, \theta S, \theta F, SF, SS\}$. Using the same reason-

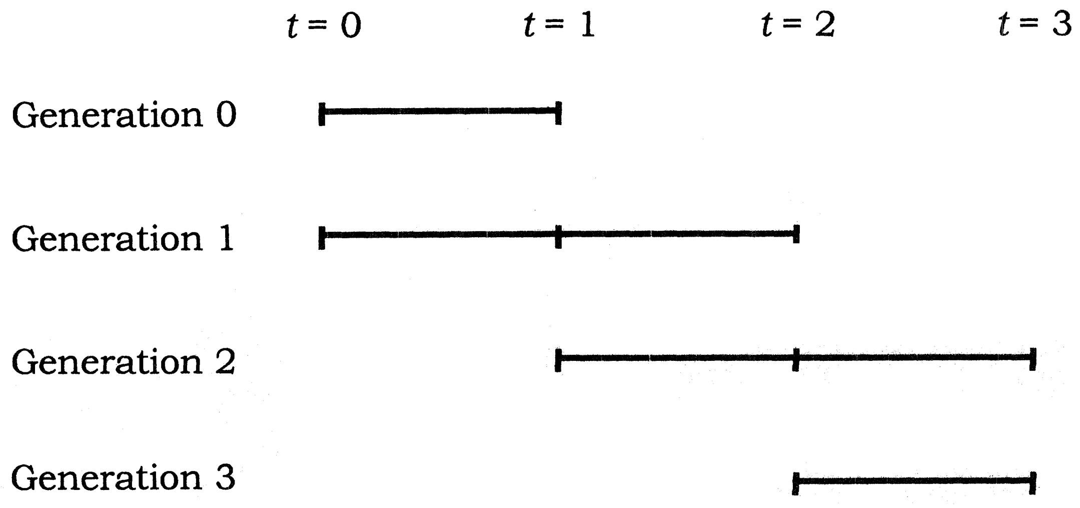

FIGURE 3. A THREE-PERIOD ECONOMY

ing as in the previous section, no name that had a F in the first period will survive at $t = 2$ (see footnote 16). Similarly define $\Pr_t\{G|h_t\}$. For expositional convenience I will refer to names that end with a success and had no failures as a *successful name.* The following proposition shows that in this three-period model it is no longer true that an equilibrium can exist where only good agents buy successful names at $t = 1$ and at $t = 2$.

PROPOSITION 3: *For the three-period model no equilibrium exists in which successful names are bought only by good types, and* $w_2(SF) > w_2(\theta\theta)$.

The proof of Proposition 3 appears in the Appendix, and the intuition behind it is simple. Consider the case where $w_2(SF) > w_2(\theta\theta)$ as the proposition states. This means that an agent who bought a S name at $t = 1$, and then failed, will earn a premium over the revenue received by an agent without an established name at $t = 2$. A good type will get this premium only when he fails (with probability $1 - P_G < 1$), while a bad type fails for sure and gets this premium. Therefore, under these circumstances a bad type will value a S name at $t = 1$ more than a good type, so it cannot be that only good types by successful names at $t = 1$. That is, if names do not lose enough value after a failure then bad types will value them more than good types do.

This analysis shows that different types will have different benefits from buying a name. Generally, two effects are responsible for this difference. The first effect comes from the fact that good types are more likely to maintain a good name than bad types are. This allows good types to reap benefits over a longer period of time (on average), which in turn gives them a higher willingness to pay for a good name than bad types would have. As mentioned in the introduction, I call this the "Reputation Maintenance Effect." This effect is strongly related to the result obtained by Kreps:[17] Reinterpret a good type as an agent who intends to honor trust, while a bad type cannot honor trust (it is extremely costly for him). Then, in Kreps's model, an agent will buy the firm if and only if he intends to honor trust. This is the reputation maintenance effect at work. The second effect that arises in the present model is that good types can build a good name of their own while

[17] Benjamin Klein and Keith B. Leffler (1981) have a similar force at work: A firm will invest in firm-specific sunk costs only if it intends to produce a high-quality good and reap a stream of future profits, which will not be realized if the firm "cheats" and produces a low-quality good.

bad types cannot. Therefore, if failures do not cause a strong enough depreciation of a firm's reputation then good types will have a lower willingness to pay than bad types—bad types gain more until the name is depreciated. I call this the "Reputation Start-up Effect." This effect is not present in Kreps's model (or Klein and Leffler's) because first, in his model people cannot build their own names and, second, he does not model clients' revision of their beliefs.

Proposition 3 can be intuitively understood using the restaurant story. If clients believed that a reputable restaurant would only be sold to a good chef, then they would attribute any future bad meal in this restaurant to bad luck. Such beliefs would cause the "Reputation Start-up Effect" to overcome the "Reputation Maintenance Effect," causing a bad chef to outbid the good chef, since the latter could start a restaurant that would likely succeed. For clients to update their expectations downward, they must believe that fundamental changes can occur at any time—in particular, that some good restaurants will indeed be bought by bad chefs.

This type of result extends beyond the simple adverse selection model employed here. Mailath and Samuelson (1998a) employ a model that combines actions (moral hazard) as well as adverse selection and conclude that reputational pure-strategy equilibria can exist only if there are unobservable exogenous shifts of types along the infinite-horizon game. This is analogous to Assumption 2 in this paper, and the reputation dynamics they get are similar to those of my model. In another paper, Mailath and Samuelson (1998b) endogenize the shift of types and introduce an auction for reputations. They get a result similar to Proposition 3: very high reputations are more likely to be bought by bad types, whereas average reputations are more likely to be bought by good types.

From the analysis it is clear that the model employed in this paper generates reputation-relevant equilibria that are robust to very short horizons of the finite economy. For the sake of theoretical completeness it is natural to consider longer horizons, and in particular the infinite-horizon economy. Note, however, that the analysis of Proposition 1 and Proposition 3, respectively, readily extend as follows (the proofs are a straightforward adaptations of the proofs provided earlier).

PROPOSITION 4: *For any finite- or infinite-horizon economy names must be traded in all periods of any dynamic equilibrium.*

and

PROPOSITION 5: *For any finite- or infinite-horizon economy successful names must be bought by some bad types in all periods (but the last one) of any dynamic equilibrium.*

The forces that drive Proposition 1 continue to work in any finite- or infinite-horizon economy—if no names are traded at time t then it must be that $\Pr_t\{G|\theta S\} > \Pr_t\{G|\theta\}$, which would create demand for these names. Also, the forces that drive Proposition 3 (the "Reputation Maintenance Effect" and the "Reputation Start-up Effect") will be present in any dynamic equilibrium—if only good types buy a name ending with S at some time t, then bad types will value that name more for the next two periods. It turns out that if reputations are identified with histories then the formal analysis of equilibria in models with longer horizons is very tricky and quite cumbersome. Moreover, even when concentrating only on steady-state equilibria (SSE), the analysis becomes practically intractable. For more on this issue see Tadelis (1999).

IV. Discussion

This paper begins with the observation that name trading and name changing seem to be a rule, rather than an exception, and demonstrates how a natural assumption about the nonobservability of ownership shifts is needed to cause these phenomena. The first point the paper makes is that a very simple adverse selection model together with this nonobservability assumption yields reputational equilibria that are robust to very short horizons, unlike most of the standard reputation literature. In particular, this is in stark contrast to Kreps's model of names as assets in which there are many equilibria where names are not traded. As Kreps (1990 p. 111) writes: "The reputation construction is decidedly fragile: If reputation works only because it works, then it could fall apart without much difficulty. In real life, these risks will appear as substantial costs of undertaking transactions in this way." Indeed, if real-life situations were strictly ones of moral hazard alone then this conclusion would be true. However, introducing adverse selection can allow reputation to "build by itself" since past performance contains information about who is likely to be behind a name. Mailath and Samuelson (1998a) also stress the importance of adverse selection for such dynamics.

This points at an important theoretical distinction between my model and Kreps's model. My model does not rely on bootstrap equilibria, whereas Kreps's model, as any other repeated-game model, relies on the existence of multiple equilibria to support the "desired" equilibrium. This is also true for the "Brand Name" reputation model of Klein and Leffler (1981). That is, punishment with a "bad" equilibrium is what supports the desired equilibrium. Here, in contrast, any equilibrium in which names are traded is not supported by a threat to move to another equilibrium, but rather by the (correct) updated beliefs of the clients.[18]

Furthermore, the bootstrap equilibrium in the repeated-game approach fails to illuminate the process by which names with no initial value become valuable after good performance, a process that is well documented in reality. In any repeated-game model the equilibrium value of a reputation is arbitrarily fixed at the beginning of the game.[19] In fact, Mailath and Samuelson (1998a p. 3) make this point quite clearly by stating that: "The simplest standard reputation model has only two types, ordinary and Stackelberg. In that setting there is no reputation building. Rather than being built gradually, reputations spring to life, ..." Mailath and Samuelson (1998a) start with the standard moral hazard, game-theoretic approach and modify it by introducing agents whose types change, with a positive probability, *infinitely often,* and these changes are *unobserved* by the clients (similar to Assumption 2 of this paper). This yields the reasonable reputation dynamics that are observed in reality. In the model of this paper *only* adverse selection is employed, which is enough to cause these dynamics to emerge in a natural way. The result is fluctuations in the value of a firm's reputation that are due to the market (correctly) changing its beliefs with respect to who is running the firm. This may suggest that adverse selection lies at the heart of reputation dynamics as much as, if not more than, moral hazard.

The paper also sheds light on the effects that cause different types to value reputations differently. Good types value good names because of their future prospects to maintain it, whereas bad types value good names because they lack the ability to build one themselves. It was shown that the appealing situation in which the market for names separates good types from bad types cannot be sustained in equilibrium. This result is a direct outcome of the adverse selection model, which implies that clients update their beliefs in equilibrium—if only good types buy good names then beliefs cannot be updated. Indeed, if we believed that good names were always bought by good types, then a short period of bad performance would not cause a loss in reputation. The fact that this cannot be an equilibrium causes clients to update their beliefs downwards after bad performance, anticipating that downward shifts in performance are a signal of some permanent change in the restaurant. These belief dynamics are consistent with the stylized facts that businesses lose (gain) reputation after poor (good) performance, making this model quite novel in the endogenous explanation of reputation dynamics.[20]

[18] Note that when equilibria are restricted to be Markov Perfect Equilibria (MPE), then in Kreps's model, as in any other repeated-game treatment of reputation, no reputational equilibria are MPE. Here, in contrast, all equilibria are MPE because clients change their willingness to pay due to updated beliefs, and not as a punishment. See Maskin and Tirole (1988 p. 592) for a similar discussion. Mailath and Samuelson (1998b) have reputational MPE due to the continuing flow of adverse selection through unobserved shifts of ownership.

[19] As Kreps alludes to in his paper, his model can be modified so that names lose value in equilibrium. This can be done by adding some noise to the firm's performance, and equilibria similar to those in Edward J. Green and Robert H. Porter (1984) can be sustained in which names will lose value with probability one. Note, however, that value cannot be enhanced in these equilibria, and the initial value of a reputation in any equilibrium will be set arbitrarily.

[20] Douglas Gale and Robert W. Rosenthal (1994) analyze a model in which reputations are built and later destroyed. In their model, however, the destruction follows some exogenous change of the environment and is not due to an endogenous market for reputations.

Of course, in reality moral hazard and adverse selection are both present. It is quite easy to see that in an OLG model that mixes adverse selection with moral hazard as in Diamond (1989) or in Tirole (1996), the first result must be true: names must be traded because otherwise the gap in prices due to Bayesian updating will induce new agents to buy retired names. The work of Mailath and Samuelson (1998b) suggests that both the start-up and maintenance reputational effects discussed earlier will carry over to a model which combines both moral hazard and adverse selection. I will conclude with a brief discussion of some interesting extensions and avenues for future research.

A. *Public Announcements*

As mentioned in Section II, the model is consistent with the phenomenon of signs reading "*under new management,*" which are frequently seen on doors of restaurants that went bad. Use of such signs is exactly like changing a restaurant's name without moving its physical assets. A question that naturally arises is why should we not see good firms trying to secure their identity with signs reading "*under the same ownership since 1976.*" The model here does not allow for such revealing signals, but one can argue that in reality they are not easy to verify. Clearly, businesses that have signs claiming that they have been owned by the same family for 75 years convey little information about the quality of the current owner, let alone of the key employees. Thus, I would argue that trying to distinguish oneself would not be easy when these signals have little meaning. It would be interesting to introduce the possibility of costly certification, but as long as costs are such that some portion of the potential clients remains uninformed, all the results of the paper will continue to hold. Note that if continuous ownership were costlessly verifiable then only Proposition 1 would change. Trade of names would no longer be necessary, but could still be supported in equilibrium. Proposition 3 would continue to hold: in any equilibrium with trade, some bad types must buy names for poor performance to cause belief updating.

B. *More Complex Organizations*

The model analyzed here has single agent-owner firms providing services for clients. In reality, firms are complex organizations made up of many individuals. Furthermore, in public firms the (often dispersed) owners do not actually perform the services themselves. I believe, however, that the analysis of the stylized model presented here can be extended to include the more general case of larger organizations. First, changes in ownership of large organizations (shifts of share-blocks) are commonly associated with replacement of current management. If one interprets good owners as having the ability to screen potentially bad managers, while bad owners cannot, then both the results of name trading and of the reputational effects should continue to hold. Second, when considering firms with dispersed ownership, one can interpret the competition for names not from the point of view of the owners, but rather from the managers who want to belong to the successful firms in order to increase their own reputation. If managers' actions have long-term effects, then immediate payments can cause the "Reputation Start-up Effect" to overcome the "Reputation Maintenance Effect," implying that bad managers would fiercely compete for these positions. If, however, payment is postponed to rely somehow on the future performance (thus, overcoming the problem of noncontractibility) then this situation will be remedied. This is a further justification of using stock options as a form of payment to high-ranking managers in firms.

C. *Umbrella Branding*

The marketing literature has addressed the question of whether a firm should brand a new product with its established brand name, a practice referred to as "Umbrella Branding." Birger Wernerfelt (1988) develops a model in which umbrella branding is costly, thus it acts as a signal to separate high-quality new products from low-quality ones. In a recent working paper, Luis Cabral (1998) adapts the model of this paper to address this issue and obtains similar separation type results to those of Wernerfelt. However, in Wernerfelt the assumption that drives the separation of types is that it is more costly to umbrella brand a new product than to market it separately, whereas by using the basic structure of this model, Cabral obtains these costs endogenously through the fact that bad performance of new products causes lowered expectation for both old and new products. This emphasizes the risks of umbrella branding through cross-reputation effects of the products using the same name brand. In this spirit, an interesting avenue for future research would be to see when one firm would allow another to use its brand name for a price (similar to franchising).

Appendix

PROOF OF LEMMA 1:

I will concentrate on new agents (the analysis readily extends to agents who failed and actively continue). Assume first that some agents strictly prefer buying a S name to not buying one. Observe, however, that the only effect a name has for agents at $t = 1$ is to increase their wages relative to the wage of an agent without a name, and this effect is identical for both G-types and B-types. So, if some agents prefer buying a S name then all agents entering the economy at $t = 1$ would share these preferences. But the measure of new agents is 1 and the measure of supplied S names is $\gamma P_G < 1$, which creates excess demand, and this in turn will cause the price of a S name to rise. Therefore, in equilibrium no type of agent can strictly prefer to buy a S name. From Proposition 1 we know that trade of S names must occur which concludes the proof of this lemma.

PROOF OF PROPOSITION 2:

Market clearing must be satisfied in any equilibrium, thus (δ, ρ) must satisfy (1). Also, it must be the case that in equilibrium $v(S) \geq 0$, or equivalently, $w_1(S) - w_1(\theta) \geq 0$ (otherwise no agent would by a S name). Since $w_1(h) = \Pr\{G|h\} \cdot P_G$, then using (2) and (3) above (with $\varepsilon = 0$) this inequality can be written as:

$$\frac{\gamma P_G + \delta\gamma}{2\gamma P_G} \geq \frac{2\gamma - \gamma P_G - \delta\gamma}{2 - 2\gamma P_G},$$

which after rearranging becomes, $\delta \geq (2\gamma - 1)P_G$. Define $\delta^* = \text{Max}\{0, (2\gamma - 1)P_G\}$. Since $0 < \gamma < 1$ it must be the case that $\delta^* < P_G$. On the other hand we must have $\delta \leq P_G$ or else ρ must be negative to satisfy market clearing. Thus, if (δ, ρ) is an equilibrium then it must be that $\delta \in [\delta^*, P_G]$ and (δ, ρ) satisfy market clearing. Furthermore, if $\delta \in [\delta^*, P_G]$ and (δ, ρ) satisfy market clearing then the wages and prices generated by correct beliefs will constitute an equilibrium. This concludes the proof of Proposition 2.

PROOF OF PROPOSITION 3:

As for the previous sections, it is assumed that only agents who exit the economy sell off their name, and only new agents entering the economy buy names. At $t = 1$, the only names sold will be S names, since the agents who failed in the first period and continue to be active will clearly change their names. At $t = 2$, three different markets for names can exist: SS names, θS names, and SF names. Assume in negation to the proposition that at $t = 1$, S names are bought only by G-types, and at $t = 2$, SS and θS names are bought only by G-types. If SF names are not traded at $t = 2$ then $\Pr\{G|SF\} = 1$, which follows because at $t = 2$ such a history can belong only to a good type. This is true because no trade of SF names implies that such a history must belong to an agent from generation 2 who bought a S name from a retiring generation 0 agent, and by assumption such an agent must be good. In this case $w_2(SF) > w_2(\theta\theta)$ as the proposition requires. Now assume that SF names are traded at $t = 2$, and some proportion δ of G-types and ρ of B-types buy these names so that $w_2(SF) > w_2(\theta\theta)$. The utility that a good type entering the economy at $t = 1$ gets out of owning a S name is

$$u_G(S) = w_1(S) + P_G w_2(SS) + (1 - P_G)w_2(SF),$$

while his utility from not owing a name is

$$u_G(\theta) = w_1(\theta) + P_G w_2(\theta S) + (1 - P_G)w_2(\theta\theta),$$

because after failing in his first period such an agent will wish to change his name. The benefit from owning a name is therefore,

$$u_G(S) - u_G(\theta) = w_1(S) - w_1(\theta) + (1 - P_G) \times [w_2(SF) - w_2(\theta\theta)],$$

which follows because $w_2(\theta S) = w_2(SS)$ is implied from the fact that only G-types buy S, SS, and θS names. Similarly for B-types,

$$u_B(S) = w_1(S) + w_2(SF),$$

$$u_B(\theta) = w_1(\theta) + w_2(\theta\theta),$$

and,

$$u_B(S) - u_B(\theta) = w_1(S) - w_1(\theta) + w_2(SF) - w_2(\theta\theta).$$

But since $w_2(SF) > w_2(\theta\theta)$ then $u_B(S) - u_B(\theta) > u_G(S) - u_G(\theta)$. That is, B-types have a larger benefit from owning a S name at $t = 1$, which contradicts the assumption that only G-types buy S names at $t = 1$ in equilibrium. This concludes the proof of Proposition 3.

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