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{"content":"Review of Economic Studies (2006) 73, 1113–1131 0034-6527/06/00431113$02.00 c⃝ 2006 The Review of Economic Studies Limited\nThe Market for Quacks\nRAN SPIEGLER Tel Aviv University\nFirst version received March 2004; ﬁnal version accepted January 2006 (Eds.)\nA group of n “quacks” plays a price-competition game, facing a continuum of “patients” who recover with probability α, whether they acquire a quack’s “treatment”. If patients chose rationally, the market would be inactive. I assume, however, that patients choose according to a boundedly rational procedure, which reﬂects “anecdotal” reasoning. This element of bounded rationality has signiﬁcant implications. The market for quacks is active, and patients suffer a welfare loss which behaves non-monotonically w.r.t. n and α. In an extended model that endogenizes the quacks’ choice of “treatments”, the quacks minimize the force of price competition by offering maximally differentiated treatments. The patients’ welfare loss is robust to market interventions, which would crowd out low-quality ﬁrms in standard models. Thus, as long as the patients’ quality of reasoning is not lifted above the anecdotal level, ordinary competition policies may be ineffective.\n1. INTRODUCTION\nImagine a hypothetical market in which n identical “healers” are engaged in price competition over a continuum of “patients”. If a patient acquires the “treatment” offered by one of the healers, he recovers with probability α ∈ (0,1). If the patient chooses to acquire none of the treatments offered in the market, he recovers with the same probability α. We may refer to the healers as “quacks”, as they possess no skills relative to the default. If patients understood this model, they would realize that the entire industry provides a worthless service, and the “market for quacks” would be inactive. Indeed, standard market models presuppose that all market agents, ﬁrms and consumers alike, have “common knowledge of the model”. This assumption is often more plausible for ﬁrms than for consumers. Firms interact with the market on a regular basis, while consumers often make a once-and-for-all decision following a brief period of market exposure. Moreover, ﬁrms’ decision process is focused on a speciﬁc market, whereas consumers divide their attention among many markets. For these reasons, we should not expect ﬁrms and consumers to display the same quality of “market reasoning”. In this paper I study the market for quacks under the following pair of assumptions: (i) healers are standard proﬁt maximizers with respect to a correct probabilistic understanding of the market model; (ii) patients follow a boundedly rational decision rule. Instead of reasoning probabilistically with respect to a correct market model, patients reason anecdotally. They rely on random, casual stories regarding the quality of treatments and react to these stories as if they are fully informative of the actual quality of treatments. As a result, patients are exposed to exploitation by healers, because they attribute their occasional success to skill rather than luck. The question is whether market competition could mitigate this exploitative effect. I examine the extreme case of a “market for quacks”, that is, a market for a completely worthless good or service, in order to bring this question into sharper focus. To capture the patients’ anecdotal reasoning, I assume that they choose according to a simple procedure, called S(1), which I borrow from Osborne and Rubinstein (1998). A patient samples (once) each of the n + 1 treatments (the quacks and the default). The patient’s sample assigns an outcome xi ∈ {0,1} to alternative i, where xi = 1 (0) means that the outcome was a success\n1113\n\n1114 REVIEW OF ECONOMIC STUDIES\n(failure). A sample point xi is interpreted as a random anecdote that the patient has gathered about treatment i, either from his own past experience or from a fellow patient. The patient chooses the treatment i that maximizes xi − pi in his sample. The outcome of his decision is a new, independent draw from treatment i. The quacks take into account the patients’ choice procedure when determining their pricing strategy. The patients’ behavioural model is relevant to markets for goods or services, which generate a random outcome when it is difﬁcult for consumers to gain hard, persistent evidence of their quality. I have in mind “soft expertise” industries such as psychotherapy, management consulting, forecasting, and alternative medicine. The effects of skill and luck are hard to disentangle in these industries. Moreover, consumers often enter them when they face an unexpected problem, hence their consumption is not preceded by a long learning phase. In such circumstances, consumers are more likely to rely on anecdotes such as “a friend of mine has taken this pill and he feels better now”, or “we should trust this political analyst because he foresaw the collapse of the USSR”. The “imperfect rationality” inherent in the S(1) procedure should not be confused with ordinary imperfect information. Indeed, in Section 5 I argue that a “twin model” with imperfectly informed, rational patients would yield different results. To the extent that the procedure reﬂects ignorance on the patients’ part, their ignorance is more characteristic of early stages of a learning process in which the model itself (rather than the value of its fundamentals) is still poorly known. Similarly, the sampling component of the S(1) procedure should not be confused with ordinary models of consumer search. The patient’s true expected pay-off from choosing i is α − pi, whereas in a search model it would be the sample realization xi − pi. The price-competition game played among the quacks has a unique Nash equilibrium, which is symmetric and mixed. For every α, the “market for quacks” is active. Quacks act as “charlatans”: they charge positive prices for their worthless treatments. There is a negative relation between α and expected price. In other words, a more incurable disease generates a greater amount of charlatanry. The intuition for this result is simple: as α decreases, a patient’s sample is less likely to contain multiple successes, and this weakens competitive pressures. Activity in the market for quacks inﬂicts a welfare loss on patients: those who end up acquiring the quacks’ treatments are on average worse off than those who end up choosing the default. The welfare loss does not behave monotonically with respect to n. The reason is that the patients’ choice procedure induces an aggregate demand function, which is increasing in n. As long as n is not too large, this force outweighs the competitive force generated by a larger number of competitors. Thus, increasing the number of competitors does not necessarily reduce the quacks’ adverse effect on consumer welfare. In Section 3, I examine alternative market interventions, which may appear like effective competition policies at ﬁrst glance: (i) raising the success rate of one healer, turning him from a “quack” into a “true expert”; (ii) allowing healers of diverse quality to disclose their success rates. In the ﬁrst case, the quacks’ equilibrium behaviour and adverse welfare effects remain unchanged. In the second case, all healers (regardless of their quality) choose not to disclose their success rates. The lesson is simple: without lifting consumers’ quality of reasoning above the anecdotal level, ordinary competition policies may be ineffective. The assumption that treatments are exogenous and statistically independent is quite restrictive. Even if quacks cannot alter their success rate, they may be able to control the correlation with other quacks through their choice of treatments. In Section 4 I analyse an extended model that incorporates this consideration. Speciﬁcally, I study a stylized model of a forecasting industry in which forecasters without any special forecasting ability choose a “forecasting fee” and a rule for predicting the outcomes of “horse races”. Consumers use anecdotal evidence to evaluate the forecasters’ quality: they recall a past race at random, and pick the cheapest forecaster among those who predicted the winner in that race.\nc⃝ 2006 The Review of Economic Studies Limited\n\nSPIEGLER THE MARKET FOR QUACKS 1115\nSuch anecdotal reasoning implies that a forecaster can try to avoid competition by differentiating his predictions from his competitors’. As it turns out, in Nash equilibrium, forecasters attain the maximal degree of differentiation: their predictions are as diffuse as possible. This result may explain the proliferation of therapeutic methods that we see in alternative medicine and psychotherapy. At the end of Section 4, I argue that it may also be relevant for certain aspects of the mutual funds industry.\n1.1. Related literature\nOsborne and Rubinstein (1998) analysed games in which all players choose according to S(1). Their main concern was to construct a solution concept for such situations. In the present paper the S(1) is employed by non-strategic agents only. Therefore, it does not call for a non-standard equilibrium concept. Osborne and Rubinstein (2003) study a variant on “S(1)-equilibrium” in a strategic voting model. The S(1) procedure is related to other departures from standard probabilistic reasoning. Tversky and Kahneman (1971) demonstrated experimentally that people over-infer from small samples. They explained this phenomenon (dubbed “the law of small numbers”) as a consequence of the “representativeness” heuristic: people expect a small sample to mirror the probability distribution from which it is drawn. Rabin (2002) proposed a formal model of inference by “believers in the law of small numbers”. The S(1) procedure reﬂects an extreme version of the “law”: patients maximize utility against the empirical distribution of recoveries given by their sample, as if this were the true distribution. However, it would be inaccurate to claim that the S(1) procedure is exclusively a model of “the law of small numbers”. Rather, it is a model of anecdotal reasoning, which may have other origins, such as lack of market experience. The S(1) procedure is also linked to the model of “case-based reasoning” due to Gilboa and Schmeidler (2001), in which decision-makers evaluate an action by recalling its performance in past “cases”. Their emphasis, however, is on the question of similarity between past and current cases. To my knowledge, Rabin’s and Gilboa–Schmeidler’s models have not been incorporated into IO models. More broadly, this paper belongs to a literature that studies market interaction between rational ﬁrms and agents with boundedly rational perceptions of the market environment. Thadden (1992) studies a repeated buyer–seller interaction, when the buyer uses a non-strategic learning rule to update his beliefs regarding the quality of the seller’s good. Given this learning rule, the buyer is not exploited by the seller in the long run. Rubinstein (1993) analyses monopolistic behaviour when consumers differ in their ability to understand complex pricing schedules. Piccione and Rubinstein (2003) study inter-temporal pricing when consumers have diverse ability to perceive inter-temporal patterns. Fishman and Hagerty (2003) study voluntary disclosure by ﬁrms, when some consumers are unable to understand the content of the disclosure. Chen, Iyer and Pazgal (2002) analyse a model of price competition when consumers have memory imperfections. For other attempts to introduce non-Bayesian reasoning into game-theoretic modelling, see Eyster and Rabin (2005), Jehiel (2005), and Spiegler (2005).\n2. A BASIC MODEL\nA market consists of a continuum of identical consumers (“patients”) and n identical ﬁrms (“healers”). When a patient acquires the treatment of a healer i ∈ {1,...,n}, he “recovers” with probability α ∈ (0,1). The patient can also choose a default option, denoted i = 0, in which case he recovers with the same probability α. Every patient is willing to pay 1 for sure recovery (as shall become clear, we can ignore the patients’ risk attitudes). Healers are standard proﬁt\nc⃝ 2006 The Review of Economic Studies Limited\n\n1116 REVIEW OF ECONOMIC STUDIES\nmaximizers. They compete by choosing prices simultaneously. Denote healer i’s price by pi. Of course, p0 = 0. I assume that the healers’ activity entails no cost. Because healers’ success rate is the same as the default rate, I refer to them as quacks. Patients choose according to the following procedure, called S(1). Each patient independently samples every alternative (including the default) once. For every i = 0,1,...,n, let xi denote the outcome of the patient’s sampling of alternative i: xi = 1 (recovery) with probability α, and xi = 0 (no recovery) with probability 1 − α. The xi’s are independently drawn. I refer to a sample point as an anecdote. Given a sample, the patient chooses an alternative i ∈ argmaxi=0,1,...,n xi − pi. In case of ties, he chooses the alternative with the highest pi. If a tie remains, apply the usual symmetric tie-breaking rule.1 When a patient chooses alternative i, the outcome of treatment i is a new, independent draw, such that the patient’s true expected utility from this decision is α − pi. Quacks take into account the patients’ choice procedure when calculating their proﬁts. For example, if p1 \u003e p j for every j \u003e 1, then quack 1’s proﬁts are equal to p1α(1 − α)n, because the quack’s clientele consists of all the patients who heard a good anecdote only about him. On the other hand, if 0 \u003c p1 \u003c p j for every j \u003e 1, then quack 1’s proﬁts are equal to p1α(1 − α), because the quack’s clientele consists of all the patients who heard a good anecdote about him and a bad anecdote about the default. Quacks are allowed to use mixed strategies. However, once a price pi has been realized, quack i is committed to it as far as the patients are concerned. Patients know the exact prices; the only source of variation in their sample is the imperfect recovery rate α, which is exogenously given. A mixed strategy inﬂicts uncertainty on the quack’s opponents, not on the patients. The simplicity of the S(1) procedure inevitably means that it is artiﬁcial in a number of ways. For instance, consider the assumption that patients sample every quack. It would be more realistic to assume that patients get to hear anecdotes about a subset of quacks. The following re-interpretation of the model sidesteps this difﬁculty: assume that there are inﬁnitely many quacks, yet patients become aware of only n quacks. Under this interpretation, an increase in n cannot be interpreted as market entry, but as an increase in the patients’ awareness of available treatments. Another artiﬁcial feature is the assumption that the number of observations per quack is independent of the size of its clientele. Alternatively, we could assume (as in the word-of-mouth learning due to Ellison and Fudenberg, 1995) that patients sample n fellow patients, rather than n ﬁrms, such that they get to hear more anecdotes about quacks with a larger clientele. This variant is more difﬁcult to analyse, because the number of anecdotes per alternative is a ﬁxed point: the patient’s sample induces a probabilistic choice, which in turn induces the number of anecdotes per alternative. Such a ﬁxed point need not exist.2\nA different sort of criticism is that the model is formally equivalent to a conventional model of price competition over consumers with private values. In such a model, let vi denote the patient’s valuation of alternative i, for every i = 0,1,...,n. The vi’s are independently drawn, taking the value 1 (0) with probability α (1−α), and they are the patient’s private information. A model of this sort, albeit with continuous distributions and without an outside option, was studied by Perloff and Salop (1985, 1986). Thus, S(1)-patients in the market for quacks behave as if they were rational consumers in a market for a “differentiated product”.3\n1. I employ this tie-breaking rule merely to simplify the writing of proofs. 2. This variant seems to introduce an anti-competitive force. As I illustrate in Section 3.2, quacks prefer that their patients have an inaccurate perception of their quality. If a greater clientele implies more anecdotes, then quacks may have an incentive to raise prices in order to reduce their clientele. 3. Perloff and Salop suggested that the source of differentiation in their model could be mistakes in consumers’ perception of brands. Gabaix, Laibson and Li (2005) adopt this interpretation and study asymptotic properties of the Perloff–Salop model.\nc⃝ 2006 The Review of Economic Studies Limited\n\nSPIEGLER THE MARKET FOR QUACKS 1117\nWhat are the merits of the market-for-quacks interpretation, in light of this formal equivalence? As it turns out, the observation that S(1)-patients behave as if they have private values, while simple, has a number of useful implications. First, in a market for medical treatments, it is hard to imagine that patients have intrinsic private values for different treatments. The S(1) procedure provides a concrete process that generates the spurious “private values”, thus grounding it in market fundamentals (the recovery rate α). Second, the market-for-quacks interpretation is the source of the insights we shall obtain into the question of whether the market rewards experts for sheer luck. Third, it will lead to extended models, which would be hard to make sense of under the private-values interpretation. Finally, the market-for-quacks interpretation has radically different welfare implications. Let us turn to equilibrium analysis.\nProposition 1. There is a unique Nash equilibrium in the price-competition game played among the quacks. Every quack plays the mixed strategy given by the c.d.f.:\nG(p) = 1 α\n� 1− 1−α\nn−1√p\n� (1)\ndeﬁned over the support [(1−α)n−1,1].\nTo see the origin of expression (1), restrict attention to symmetric equilibrium and ignore the question of whether asymmetric equilibria exist. The equilibrium strategy is an atomless c.d.f. G. For every price p in the support of G, the quacks’ pay-off is given by the expression\npα(1−α)[1−αG(p)]n−1 (2)\nbecause for every quack i, α(1−α) is the probability that xi − pi \u003e x0 in a patient’s sample, and 1−αG(p) is the probability that x j − p j \u003e xi − pi for any rival quack j. It follows that\nG(p) = 1 α\n� 1− c\nn−1√p\n� , (3)\nwhere c is some constant. By standard arguments, the monopoly price p = 1 belongs to the support of G. Therefore, we can retrieve the value of c by plugging p = 1 and G(1) = 1 in expression (3).4\nCorollary 1. The quacks’ expected equilibrium price is strictly decreasing with α. In particular, E(p) → 0 as α → 1 and E(p) → 1 as α → 0.\nQuacks behave as charlatans in equilibrium: they charge a positive price for a worthless treatment. The false pretence implicit in their over-pricing gets worse as α decreases, that is, when the patients’ condition becomes more incurable. The intuition is rudimentary. As α decreases, a patient’s sample is less likely to contain multiple successes. This weakens competitive pressures and causes prices to go up. Another way of stating this intuition is that as α decreases, the degree of “product differentiation” erroneously perceived by the patients increases. Because the monopoly price p = 1 belongs to the support of G, the quacks’ equilibrium pay-off is α(1 − α)n, according to expression (2). Therefore, industry proﬁts are nα(1 − α)n. Because quacks do not contribute any added value, we may deﬁne this expression as the welfare\n4. This derivation brings to mind similar characterizations in the literature on equilibrium price dispersion (e.g. Butters, 1977; Varian, 1980; Burdett and Judd, 1983; Rob, 1985).\nc⃝ 2006 The Review of Economic Studies Limited\n\n1118 REVIEW OF ECONOMIC STUDIES\nloss that quacks inﬂict on patients in equilibrium. This expression is not monotonic in α: it attains a maximum at α∗ = 1 n+1. It also behaves non-monotonically w.r.t. n. For every α, the number of quacks that maximizes the patients’ welfare loss is n∗ = − 1 ln(1−α). For every α ⪅ 0·4,n∗ ≥ 2. That is, more competition may increase the patients’ welfare loss. As α → 0,n∗ tends to inﬁnity, such that the perverse effect of greater competition holds for a wider range. However, ﬁxing α, the welfare loss vanishes as n → ∞.5\nThe intuition for the comparative statics w.r.t. n is simple. On one hand, a greater number of quacks increases the incentive to cut prices. This is the standard “competitive” effect. On the other hand, an increase in n leads to higher aggregate demand for quacks. This “exploitative” effect is a consequence of the S(1) procedure: when the set of available treatments is larger, there is a higher chance of hearing a good anecdote about some treatment. As α decreases, it takes a larger n for the former effect to outweigh the latter. The “exploitative” and “competitive” effects can be separated in a simple manner. The max– min pay-off in the game is equal to α(1−α)n, which is precisely what quacks earn in equilibrium. Thus, the “exploitative effect” determines the max–min pay-off, and the “competitive effect” does not allow quacks to earn more than their max–min pay-offs.\n3. TWO MARKET INTERVENTIONS\nWe saw in the previous section that increasing the number of competitors does not necessarily curb the quacks’ adverse effects on patients’ welfare. As long as n is not too large, the patients’ welfare loss increases with n. This section examines two market interventions, which would normally be considered as effective competition policies. In contrast, given the patients’ behavioural model, these interventions turn out to be totally ineffective.\n3.1. Replacing a quack with an expert\nIn this subsection, I perturb the basic model of Section 2 by replacing one of the quacks with a high-quality healer. The question is whether this intervention will crowd out the quacks or at least alleviate the welfare loss that they inﬂict on patients. Formally, modify the basic model by switching the success rate of a single healer, denoted e, from α to some αe ∈ (α,1]. Apart from this modiﬁcation, the model remains intact. In particular, every other healer i ̸= e has a success rate α. In other words, healer e is an “expert” while his opponents are “quacks”. If patients knew the market model, then clearly the expert would crowd out the quacks in equilibrium. When patients choose according to the S(1) procedure, we get a very different result:\nProposition 2. There is a unique Nash equilibrium in the game. Every healer i ̸= e plays the mixed strategy given by equation (1), has the same clientele size, and earns the same proﬁts as in the Nash equilibrium of the basic model.\nTurning a quack into an expert does not affect his competitors’ equilibrium behaviour and performance. The expert ends up luring patients away from the default, not from the quacks. As a result, the patients’ welfare loss caused by the n −1 quacks remains unaffected. To get the intuition for this result, suppose that in equilibrium, all Gi’s share the same support [pL,1]. Intuitively, the presence of an expert instead of a quack could not have led the other quacks to raise their prices. Therefore, we do not expect their pricing strategy to place an\n5. The patients’ welfare loss can be substantial: for every α \u003c 1 2, there exists n ≥ 2, such that the patients’ loss exceeds 1 4. As α → 0, the welfare loss at n∗ converges to 1 e.\nc⃝ 2006 The Review of Economic Studies Limited\n\nSPIEGLER THE MARKET FOR QUACKS 1119\natom on p = 1. The expert’s pay-off from the monopolistic price p = 1 is thus αe(1 − α)n. But his pay-off from pL is pLαe(1−α), hence pL = (1−α)n−1. But because pL also belongs to the support of the quacks’ strategies, this means that quacks earn a pay-off of α(1−α)n, just as in the basic model. By deﬁnition, this is the welfare loss that an individual quack inﬂicts on patients. The identity of the supports of the healers’ strategies is a consequence of mixed-strategy equilibrium reasoning. The condition for the expert’s indifference among all prices in the support of Ge is independent of αe: it is only expressed in terms of the opponents’ success rates and pricing strategies. Therefore, it is the same condition as in the basic model, and it yields the same pricing strategy for the quacks as in the basic model. But this implies that the expert will be indifferent among the same set of prices as in the basic model. A simple calculation shows that a patient who ends up choosing the expert is better off than a patient who ends up choosing a quack. However, both are worse off than a patient who ends up choosing the default. Thus, the expert exploits the patients on account of their anecdotal inferences, although to a lesser degree than the quacks.\n3.2. Disclosure of success rates\nIn the basic model of Section 2, healers have no control over the patients’ knowledge. In this subsection, I perturb the model by assuming that a healer is able to disclose his success rate to patients. If he does not reveal his success rate, patients continue to assess his quality according to the S(1) procedure. In this context, it is appropriate to allow more general market primitives. Denote the success rate associated with alternative i by αi, and allow the αi’s to vary across alternatives, where αi ∈ (0,1) for every i = 0,1,...,n. Formally, a strategy for healer i is a pair (pi,ri), where ri = Y (N) if the healer reveals (does not reveal) his success rate. As in the basic model, xi denotes the patient’s evaluation of the quality of treatment i. When ri = Y,xi = αi with probability 1. When ri = N,xi = 1 with probability αi and xi = 0 with probability 1 − αi. As before, the patient chooses the alternative that maximizes xi − pi in his sample. Until this subsection, the S(1) procedure has meant one thing: patients reason anecdotally about the quality of alternatives. Given the model of this subsection, the procedure acquires another meaning: patients infer nothing from the healer’s disclosure policy itself. In particular, they do not realize that a healer’s failure to reveal his quality signals that his quality is relatively low. Thus, the exact sense in which the patients’ procedure departs from standard rationality may vary with the model in which it is embedded. Standard adverse-selection models with rational, imperfectly informed patients typically assume that the patients know the distribution of success rates, but do not know ex ante the success rates of individual healers. In sequential equilibrium of such models, every healer would disclose his success rate (except possibly the lowest types).6 Given our model of the patients’ behaviour, the result is the complete opposite:\nProposition 3. For every p, the strategy (p,Y) for healer i is weakly dominated by some other strategy (p′, N).\nThus, given the patients’ choice procedure, healers have an incentive not to reveal their success rate, even when they are of the highest quality. The decision whether to reveal one’s type entails a trade-off. On the one hand, when a healer deviates from ri = Y to ri = N, the “monopoly” price jumps from αi to 1. On the other hand, the fraction of patients who are willing\n6. See, for example, Milgrom and Roberts (1986, section 2).\nc⃝ 2006 The Review of Economic Studies Limited\n\n1120 REVIEW OF ECONOMIC STUDIES\nto pay anything to healer i shrinks from 1 to 1−αi. The reason that the former consideration outweighs the latter is simple. Suppose that p \u003c α. By deviating from (p,Y) to (p/αi, N), the healer replicates his monopoly proﬁts. At the same time, he attains an edge over competitors because conditional on xi = 1, the patient’s perceived utility from choosing healer i is 1− p/αi, compared to αi − p (the patient’s perceived utility from choosing healer i when ri = Y). The lesson from Proposition 3 is that enabling healers to reveal their type is ineffectual when patients choose according to the S(1) procedure.7 It is interesting to compare this result to Milgrom and Roberts (1986, section 3). In their model, consumers are strategically unsophisticated, in the sense of being unable to draw inferences from what ﬁrms choose not to reveal. However, they are probabilistically sophisticated: they draw Bayesian inferences from the content of the ﬁrms’ disclosure. Milgrom and Roberts show that in equilibrium, the full information outcome is attained, thanks to competitive forces. In contrast, patients in the present subsection are unsophisticated both strategically and probabilistically.\n4. FORECASTERS AS QUACKS\nIn the basic model, quacks’ treatments are exogenous and statistically independent. This assumption is too restrictive for a number of potential applications. For instance, industries such as alternative medicine, psychotherapy, or self-help are characterized by a proliferation of apparently distinct “therapeutic methods”. In order to illuminate this phenomenon, one would have to study a model in which a quack’s treatment, and therefore, the correlation between his own performance and his competitors’, is endogenous. In this section I analyse such an extended model. To better illustrate the extended model’s scope of applications, I abandon the alternativemedicine imagery in favour of a stylized model of a forecasting industry, in which ﬁrms are assumed to provide worthless forecasting services. This assumption is particularly natural in the case of ﬁnancial forecasting. If one believes in the “efﬁcient market hypothesis”, that is, that market prices are fully revealing, then one must accept that ﬁnancial analysts have no advantage over a rational layman when trying to predict future prices. Formally, let H = {1,...,m} be a set of horses. Let R be a ﬁnite set of races. A forecasting rule is a function t : R → H that predicts a winning horse in each race. Firms move simultaneously. A pure strategy for ﬁrm i ∈ {1,...,n} is a pair (pi,ti), where pi ∈ [0,1] is the price that the ﬁrm charges (its “forecasting fee”) and ti is the forecasting rule it adopts. A state is a pair (r,h) consisting of a race and the identity of the horse who wins in the race. The state is drawn according to the uniform distribution over R × H. Firm i’s prediction is accurate in state (r,h) if and only if ti(r) = h. The value of an accurate prediction for consumers is 1. If a consumer acquires the services of ﬁrm i, he adopts its forecasting rule. If a consumer does not acquire the services of any ﬁrm, his forecast is totally unpredictable: in each race, he predicts each horse with probability 1 m . Note that the probability that a consumer makes a correct forecast is 1 m , regardless of his decision. Thus, ﬁrms are “quacks”: they have no advantage over laymen. The assumption that ﬁrms can make race-speciﬁc forecasts plays an important role in the model. This is what allows them to control the correlation between their own prediction and their competitors’. This correlation device is natural, in the sense that real-life forecasters are expected to condition their forecasts on the speciﬁc conditions of the race. Although we assumed that these conditions are immaterial for the outcome of the race, a consumer who enters the market without realizing that this is the case would not be surprised to see ﬁrms making race-speciﬁc forecasts.\n7. It can also be shown that type disclosure can never be part of Nash equilibrium. I omit the proof of this result for the sake of brevity.\nc⃝ 2006 The Review of Economic Studies Limited\n\nSPIEGLER THE MARKET FOR QUACKS 1121\nEach consumer chooses according to the following adaptation of the S(1) procedure. He randomly samples a state (r,h); he then chooses the alternative i ∈ {0,1,...,n} that maximizes xi(r,h) − pi in his sample, where xi(r,h) = 1 if ti(r) = h and xi(r,h) = 0 if ti(r) ̸= h. In this description, alternative i = 0 represents the default, “lay” forecast, where p0 = 0 and t0(r) = h with probability 1 m for every h. The tie-breaking rule is the same as in Section 2. The following story ﬁts the procedure. In order to evaluate forecasters, the consumer recalls some past race at random. He checks which of the ﬁrms correctly predicted the winner in that race and chooses the cheapest among them. If the lay prediction was accurate, or if none of the ﬁrms made an accurate prediction, the consumer does not consult a professional forecaster. This choice procedure seems to capture the way we often judge ﬁnancial and political analysts. We recall a past episode—the success of eBay, the collapse of the U.S.S.R., etc.—and we give credit to the analysts who anticipated it while discrediting those who did not.8\nFirms take into account the consumers’ choice procedure when calculating their proﬁts. Consider a strategy proﬁle (pi,ti)i=1,...,n, where p1 \u003e ··· \u003e pn. Let Ai be the proportion of races r for which t j(r) ̸= ti(r) for any j = i + 1,...,n. The pay-off of ﬁrm i is pi �\n1 m �� m−1 m Ai � . The second and third terms represent the probabilities that i’s prediction is accurate and the lay prediction is inaccurate, respectively. If all ﬁrms choose the same forecasting rule, then ﬁrm 1 earns zero proﬁts. The ﬁrm can proﬁtably deviate by changing its forecasting rule so as to make exclusive predictions in some races. This deviation guarantees a positive clientele, consisting of consumers who sampled states in which ﬁrm 1 alone predicted the winner. Such a deviation may be viewed as an attempt to “differentiate the ﬁrm’s product”. Indeed, it is possible to regard our forecasting market as an unconventional model of spatial competition, in which ﬁrms choose a price as well as a “location” in the space of functions from R to H. In spatial-competition models, ﬁrms ﬁght opponents by reducing prices or by differentiating their product (see, for instance, d’Aspremont, Gabszewicz and Thisse, 1979). My primary objective is to characterize the diffusiveness of the ﬁrms’ forecasts (in other words, the degree of “product differentiation”) that emerges in Nash equilibrium. I restrict attention to equilibria in which the forecasting rule component of each ﬁrm’s strategy is pure, while allowing for mixing in the price component. I refer to such equilibria as Nash equilibria in semi-pure strategies. The following notation will be useful. Fix a proﬁle of forecasting rules (ti)i=1,...,n. Let Bi be the set of races in which ﬁrm i makes an exclusive prediction. That is, Bi = {r ∈ R | ti(r) ̸= t j(r) for every j ̸= i}. Denote µi = |Bi|/|R|. For every (r,h), let e(r,h) be the number of ﬁrms i for which ti(r) = h, that is, the number of ﬁrms which predict that h wins in r.\nDeﬁnition 1. A proﬁle of forecasting rules (ti)i=1,...,n is maximally differentiated if maxh e(r,h)−minh e(r,h) ≤ 1 for every r, or e(r,h) ≥ 2 for every (r,h).\nIn a maximally differentiated proﬁle of forecasting rules, the ﬁrms’ predictions in each race are as unconcentrated as possible (as long as there is a “grain of differentiation”—namely, a horse that is predicted by at most one ﬁrm in some race).\nProposition 4. In any Nash equilibrium in semi-pure strategies, the proﬁle of forecasting rules is maximally differentiated.\n8. It is crucial that (r,h) is held ﬁxed across the consumer’s sample. An alternative adaptation of S(1) would assume that (r,h) is drawn independently for each alternative. This would reduce the formalism to the model of Section 2, with α = 1 m . I ﬁnd this version less natural in the context of a forecasting industry.\nc⃝ 2006 The Review of Economic Studies Limited\n\n1122 REVIEW OF ECONOMIC STUDIES\nThus, a necessary condition for Nash equilibrium in semi-pure strategies is that ﬁrms make maximally differentiated predictions. When n ≤ m, the implication is that they make exclusive predictions in each race: e(r,h) ≤ 1 for every (r,h). When m \u003c n \u003c 2m, every race r is characterized by n − m horses that are predicted by two ﬁrms and 2m − n horses that are predicted by one ﬁrm. When n ≥ 2m, ﬁrms never make exclusive predictions: e(r,h) ≥ 2 for every (r,h). Note that if we knew that all ﬁrms play the same pricing strategy, the result would be trivial. In each race, ﬁrms would have a clear incentive to pick a horse that is predicted by as few competitors as possible. The importance of Proposition 4 is that it does not rely on any restriction on the ﬁrms’ equilibrium pricing behaviour. To see the main argument behind the result, consider the case of m \u003e n and suppose that the proﬁle of forecasting rules is not maximally differentiated. It is easy to show that e(r,h) = 1 for some (r,h). Let r∗ be a race with the maximal number of horses for which e(r,h) = 1. Then, there must be at least three ﬁrms—say, 1,2,3—which predict the same horse h in r∗. Consider any ﬁrm i that makes an exclusive prediction in r∗. The only reason for ﬁrm 1 not to change its prediction in r∗ from h to ti(r∗) is that ﬁrm i is (probabilistically) cheaper than ﬁrms 2 or 3. But now consider some other race r∗∗ which belongs to B3. A central lemma in the proof of Proposition 4 establishes that such a race must exist. If some other ﬁrm predicts the same horse h′ as ﬁrm i, then that ﬁrm must strictly prefer changing its prediction in r∗∗ from h′ to t3(r∗∗), because ﬁrm i is cheaper than ﬁrm 3. It follows that r∗∗ ∈ Bi. But this means that if ﬁrms 1,2, or 3 make an exclusive prediction in r∗∗, then so does any ﬁrm i which makes an exclusive prediction in r∗, in contradiction to the deﬁnition of r∗. Let us turn to the ﬁrms’ equilibrium pricing behaviour.\nProposition 5. Let n ≤ m. There exist Nash equilibria in semi-pure strategies. In equilibrium, each ﬁrm plays p = 1.\nThis is an immediate consequence of the “maximal differentiation” result. Because ﬁrms make exclusive predictions in each race, they can afford to price monopolistically. The following result deals with the other extreme. When ﬁrms never make exclusive predictions, they have no market power and therefore the market price is competitive.\nProposition 6. Let n ≥ 2m. There exist Nash equilibria in semi-pure strategies. In equilibrium, the price paid by consumers is 0.\nThe case of m \u003c n \u003c 2m is more complex. For simplicity, I restrict attention to equilibria that are symmetric in the price component. In addition, I assume that |R| is a multiple of � m n−m � , in order to guarantee equilibrium existence.\nProposition 7. Let m \u003c n \u003c 2m. There exists Nash equilibria in semi-pure strategies, which are symmetric in the price component. Each ﬁrm plays the pricing strategy given by the c.d.f. G(p) = p −µ p − pµ (4)\ndeﬁned over the support [µ,1], where µ = 2− n m .\nThe lesson from the last trio of results is that equilibrium pricing behaviour is qualitatively the same as in the basic model. Speciﬁcally, expected equilibrium price rises as the number of horses increases or, equivalently, as the probability of making a correct prediction decreases. The\nc⃝ 2006 The Review of Economic Studies Limited\n\nSPIEGLER THE MARKET FOR QUACKS 1123\nintuition is that as m increases, ﬁrms have “more room” to differentiate themselves in the space of functions from R to H. As a result, competitive forces are weaker and prices go up.\nCompletely mixed strategies. The restriction to strategies with a pure forecasting rule component carries a loss of generality. Once we allow ﬁrms to randomize in both components, there exists an equilibrium in which each ﬁrm assigns probability 1 m to each horse, independently of the race, and plays the pricing strategy given by Proposition 1 with α = 1 m . Note that when n ≥ 2m, this equilibrium implies positive industry proﬁts, while equilibrium in semi-pure strategies results in zero industry proﬁts. Conversely, when n ≤ m, industry proﬁts are higher in semi-pure equilibria. Thus, when the number of ﬁrms is small, they are better off playing an equilibrium in which their predictions are as differentiated as possible. But when there are many ﬁrms, they are better off playing an equilibrium in which their predictions are statistically independent.\nPossible implications for the mutual funds industry. While the analysis in this section has relied on the “forecasting” metaphor, I believe that the results are potentially relevant for a host of markets. Proposition 4 sheds some light on the phenomenon described at the beginning of this section, namely, the proliferation of therapeutic methods in alternative medicine.9\nThe mutual funds industry is another case in point. Since Jensen (1968), ﬁnancial economists have gathered evidence that fund managers do not systematically outperform passive benchmarks. Moreover, their performance is largely unpredictable from past relative performance. Nevertheless, ﬂows into and out of mutual funds are highly sensitive to their recent relative performance (see Chevalier and Ellison, 1997; Sirri and Tufano, 1998). In light of these stylized facts, it seems sensible to search for a “market for quacks” account of the mutual funds industry. An index fund may be viewed as a default option, whereas actively managed funds may be viewed as quacks. The sensitivity of ﬂows to past relative performance is an immediate consequence of investors’ anecdotal reasoning. Proposition 4 suggests that fund managers may choose highly specialized investment strategies as a means of avoiding competition. Propositions 5–7 suggest a positive relation between the underlying market risk (captured by the parameter m) and the fees that mutual funds charge. Careful modelling of the industry as a “market for quacks” is left for future research.\n5. CONCLUDING REMARKS\nThis paper presented a model with rational ﬁrms and consumers who are boundedly rational, in the sense that they reason anecdotally about ﬁrms’ quality. Anecdotal reasoning implies that consumers react to a common-value environment as if they have independent private values. As a result, a market for a worthless service becomes active and displays anomalous features: standard competition policies may be ineffective; a decrease in the quality that characterizes the industry results in higher prices; and ﬁrms can avoid competition by making divergent recommendations about the desired action. These results may illuminate phenomena associated with “soft expertise” industries such as alternative medicine, forecasting, and money management.\nImperfect rationality or imperfect information? Although the models presented in this paper are simple, the modelling procedure they embody is unusual. Our starting point is a standard price-competition model with complete information. Economists typically depart from such a simple benchmark by perturbing its informational structure, without abandoning the meta-level assumption that “the model itself is common knowledge”. Instead, in this paper we\n9. Under an alternative-medicine interpretation of the model, R would be a set of medical conditions, H would be a set of treatments, and t would be a “therapeutic method”.\nc⃝ 2006 The Review of Economic Studies Limited\n\n1124 REVIEW OF ECONOMIC STUDIES\nrelaxed the rationality of consumers’ choice with respect to the complete-information model. The question naturally arises, whether the basic model and its various extensions could be “rationalized”, in the sense that the same results could be obtained from a price-competition model with imperfectly informed consumers. In other words, can we replace imperfectly rational patients with imperfectly informed patients and get the same results? Let us begin with the simplest attempt to rationalize the basic model of Section 2. Suppose that the healers’ success rate is drawn from some prior distribution over {αL,αH}. The distribution of types is commonly known. Healers know their own success rates, whereas patients observe partially informative signals. Such a model cannot yield exactly the same results as our model. Note that in the model of Section 2, patients behave as if they are absolutely certain of the quality of each alternative, and consequently their willingness to pay “jumps” to 1 or 0. A partially informed, rational patient would not display a “jump” to these extreme posteriors. Thus, although equilibrium strategies will be mixed in the manner of Proposition 1, it will be impossible to reproduce expression (1). More importantly, the two models have different comparative statics with respect to the industry’s average success rate. In the model of Section 2, equilibrium prices decrease with α. In contrast, in the alternative model proposed here, if we raise αL and αH by the same factor, equilibrium prices will increase by this factor as well. When we turn to some of the extensions of the basic model, the disparity between the two modelling approaches widens. In the model of Section 4, the statistical structure of a ﬁrm’s product is endogenous. If we tried to rewrite the model with imperfectly informed, rational patients, then in equilibrium they would have to know the ﬁrms’ forecasting rules. It is hard to see how one could reconcile such equilibrium knowledge with the behaviour we attempt to rationalize. In the model of Section 3.2, healers are allowed to reveal their type. We have already observed the contrast between the no-revelation result we obtain and the full-revelation result obtained in a standard model with imperfectly informed patients (e.g. Milgrom and Roberts, 1986, section 2). Similar differences between the two approaches will emerge in any model in which healers can signal their type.\nExtension of the decision procedure. The S(1) procedure captures an extreme case of anecdotal reasoning: patients form deterministic action–consequence correspondences on the basis of a single observation per alternative. A natural generalization of this procedure, suggested by Osborne and Rubinstein (1998) and called S(K), is to assume that patients sample every alternative K times and maximize their expected pay-off against the empirical distribution generated by their sample. Thus, patients form an unbiased “point estimate” of the success rate associated with each alternative, but they behave as if there is no sampling error. As K gets larger, the sampling error decreases, and in the limit, the patient’s procedure converges to the rational-choice benchmark. There is some formal relation between the S(K) procedure and the model of “inferences by believers in the law of small numbers” due to Rabin (2002). In this model, an individual decisionmaker observes repeated draws from an i.i.d. process, and tries to learn the process. He updates his belief according to Bayes’ rule, under the false assumption that the draws are taken from an urn with K balls without replacement. After K observations, the decision-maker believes that the urn is reﬁlled. Thus, Rabin’s decision-maker predicts the (K + 1)-th observation just like an S(K)-agent. However, in other respects the two models are incomparable, because the S(K) model is static whereas Rabin’s model is dynamic.\nThe patients’ knowledge of the default. The basic model assumes that the patients’ choice procedure treats the default and the healers symmetrically: patients sample each of them once. It could be argued that patients are more familiar with the default than with the healers, and\nc⃝ 2006 The Review of Economic Studies Limited\n\nSPIEGLER THE MARKET FOR QUACKS 1125\nthat they may even know the success rate associated with the default. Therefore, it makes sense to consider a variant on the model, in which x0 = α with probability 1. The patients form quality assessments of healers as in the basic model. The essential features of our equilibrium characterization—uniqueness, symmetry, price dispersion, as well as the comparative statics—remain unchanged under this modiﬁcation. Only ﬁne details have to be modiﬁed: the “monopoly price” becomes 1 − α instead of 1; the exact expression for G is slightly different; and the welfare analysis needs to be reﬁned. In particular, the patients’ welfare loss is lower than in the basic model. The reason patients experience a loss at all is that they compare an alternative they are highly familiar with (the default) with alternatives they know only through anecdotal evidence, as if a single anecdote has the same informational content as full knowledge of a probability distribution.\nRelaxing quackery. Our analysis is easily extendible to the case in which the default success rate is α0 \u003c α. With standard rational patients, the model is reduced to standard Bertrand competition, such that equilibrium price is 0, and the patients’ expected utility is α − α0. By comparison, with S(1) patients, Proposition 1 continues to hold. The reason is simple: the default success rate enters the healers’ pay-off function through the multiplicative term 1 − α0, and it cancels out when we derive the expression for G. Therefore, the healers’ behaviour is independent of α0. The welfare analysis is modiﬁed. For instance, when α0 = 0, the patients’ expected utility in equilibrium is α − nα(1 − α)n−1. It follows from this expression that there is a net welfare loss if α is sufﬁciently low.\nA dynamic justiﬁcation for the S(1) procedure. The models presented in this paper are static. However, the interpretation of S(1) as a best reply to a random sample suggests a dynamic learning context. The following is an outline of an explicit dynamic model which justiﬁes our basic model. Quacks commit to their pricing strategy at period t = 0 (if a quack plays a mixed strategy, it commits to its realization). At any period t \u003e 0, a constant measure of patients enter the market, make a one-shot decision and then exit the market. The outcome of a quack’s treatment is drawn independently each time it is chosen. Patients choose according to the following rule: (i) with probability 1−ε, they imitate the patients who earned the highest pay-off at t −1; (ii) with probability ε, they choose each of the n + 1 alternatives with equal probability. This is simply a best-reply dynamics combined with blind experimentation. It can be shown that as ε tends to 0, patients’ long-run average behaviour converges to the average behaviour implied by the S(1) procedure.\nAPPENDIX. PROOFS\nProof of Proposition 1. Quack i’s equilibrium strategy si induces a c.d.f. Gi over the interval [0,1]. The main task in this proof will be to show that the equilibrium is symmetric. The proof proceeds stepwise.\nStep 1. For every quack i, Gi is continuous over [0,1).\nProof. Since Gi is monotonic, it is sufﬁcient to show that si contains no atoms on [0,1). Assume the contrary and suppose that si contains an atom on some p \u003c 1. If p = 0, then quack i assigns a positive measure to a price that yields zero proﬁts. As we noted in Section 2, the quacks’ max–min pay-off is α(1 − α)n \u003e 0. Therefore, the quack can proﬁtably deviate by shifting this measure to some p \u003e 0. Now suppose that p ∈ (0,1). If every other quack assigns no weight to the interval (p, p +ε), then quack i can proﬁtably deviate by shifting the atom from p to p +ε/2. And if some quack j ̸= i assigns weight to the interval (p, p +ε) for arbitrarily small ε, then there exists δ \u003e 0 such that quack j can proﬁtably deviate by shifting this weight to p −δ. In the remainder of the proof, we shall rely on two additional observations. First, if Gi has an atom on p = 1, then no other G j has an atom on p = 1. Otherwise, either of these quacks would be able to deviate proﬁtably by shifting this\nc⃝ 2006 The Review of Economic Studies Limited\n\n1126 REVIEW OF ECONOMIC STUDIES\natom slightly downward. Second, if s assigns a positive weight to an interval (p, p +ε) or (p, p −ε) for some p ∈ (0,1) and ε \u003e 0, then p maximizes quack i’s expected pay-off against s−. This is a standard result which follows from Step 1. Let pL i and pH i denote the inﬁmum and supremum of the support of Gi. Deﬁne pL = min{pL 1 ,..., pLn } and pH = max{pH 1 ,..., pH n }. ∥\nStep 2. pH = 1.\nProof. Assume that pH \u003c 1. Then by Step 1, none of the Gi’s contain an atom on pH. It follows that the pay-off of the quack who charges pH is pHα(1−α)n, which is below the max–min pay-off, a contradiction. ∥\nStep 3. All quacks earn the same pay-off in equilibrium.\nProof. Assume the contrary, and suppose (without loss of generality, wlog) that quack 1 earns a higher pay-off than quack 2. Suppose that quack 2 deviates by playing pL 1 with probability 1. Quack 1’s pay-off before the deviation is:\npL 1 α(1−α) �\nj\u003e1 [1−αG j(pL 1 )], (5)\nwhereas quack 2’s pay-off after the deviation is:\npL 1 α(1−α) �\nj\u003e2 [1−αG j(pL 1 )], (6)\nand since the second expression is at least as high as the ﬁrst expression, quack 2’s deviation is proﬁtable. ∥\nStep 4. The quacks’ equilibrium pay-off is α(1−α)n.\nProof. By Step 2, pH = 1. We have observed that there exists a quack i whose competitors do not place an atom on p = 1. This quack’s pay-off is α(1−α)n. By Step 3, all quacks earn this pay-off. ∥\nStep 5. No quack places an atom on p = 1.\nProof. Suppose that quack i places an atom on p = 1. We have observed that no other quack places an atom on p = 1. Suppose that the second-highest pH j is strictly lower than 1. Then, pH j does not maximize j’s pay-off, because if j charged a slightly higher price, the probability that he is chosen by a patient would not change. It follows that pH j = 1. But since quack i places an atom on p = 1, quacks i and j earn different pay-offs, in contradiction to Step 3. ∥\nStep 6. pL i = pL for all quacks i.\nProof. Assume the contrary, and suppose (wlog) that pL 2 = pL and pL 1 \u003e pL. Suppose that quack 2 deviates by playing pL 1 with probability 1. Expressions (5) and (6) represent quack 1’s pay-off before the deviation and quack 2’s pay-off after the deviation, respectively. Because G2(pL 1 ) \u003e 0, expression (6) is higher than expression (5). By Step 3, quacks 1 and 2 earn the same pay-off prior to the deviation. Therefore, the deviation is proﬁtable. ∥\nStep 7. For every quack i, Gi is strictly increasing in [pL i , pH i ].\nProof. Assume the contrary, and suppose (wlog) that G1 is ﬂat over some interval (p, p′) ⊂ [pL 1 , pH 1 ]. By Step 6, pL 1 = pL 2 . Then, there must be some other quack (denoted 2, wlog) who assigns positive weight to the neighbourhood of p, otherwise, p would not maximize quack 1’s pay-off. The two quacks’ pay-off from the prices p and p′ are\nπ1(p) = pα(1−α)[1−αG2(p)] �\nj\u003e2 [1−αG j(p)]\nπ2(p) = pα(1−α)[1−αG1(p)] �\nj\u003e2 [1−αG j(p)]\nπ1(p′) = p′α(1−α)[1−αG2(p′)] �\nj\u003e2 [1−αG j(p′)]\nπ2(p′) = p′α(1−α)[1−αG1(p′)] �\nj\u003e2 [1−αG j(p′)].\nc⃝ 2006 The Review of Economic Studies Limited\n\nSPIEGLER THE MARKET FOR QUACKS 1127\nBy Step 3, π1(p) = π2(p). Therefore, G2(p) = G1(p). By assumption, G1(p) = G1(p′), whereas G2(p′) \u003e G2(p). Therefore, quack 2 can proﬁtably deviate by playing p′ with probability 1. ∥\nStep 8. The equilibrium is symmetric, and the equilibrium strategy is given by expression (1).\nProof. By Step 6, pL i = pL for every quack i. Denote p∗ = min{pH 1 ,..., pH n }. By Step 7, all the Gi’s are strictly increasing in [pL, p∗]. By Step 4, all quacks earn a pay-off of α(1 − α)n. Therefore, for every quack i and every price p ∈ [pL, p∗]: α(1−α)n = pα(1−α) �\n̸=i [1−αG j(p)].\nWe have a system of n equations in n variables G j(p). The equations are symmetric and the R.H.S. is strictly decreasing in the G j(p)’s. Therefore, the system has a unique solution, which is symmetric. In particular, it follows that pH i = p∗ for every quack i. It is now straightforward to derive expression (1). By construction, every element in the support of G is a best reply to G−i, hence we have a Nash equilibrium. ∥ ∥\nProof of Corollary 1. Given the formula for G(p) given by Proposition 1, it is easy to calculate the expected equilibrium price:\nE(p) =\n� − 1−α α ln(1−α) for n = 2 1−α α(n−2)[1−(1−α)n−2] for n \u003e 2.\nIt is straightforward to show that both expressions decrease with α, and that their limits are limα→1 E(p) = 0 and limα→0 E(p) = 1. ∥\nProof of Proposition 2. Let us borrow the deﬁnitions of pL i , pH i , pL, pH from the proof of Proposition 1. Steps 1 and 2 can also be borrowed. In addition, no more than one healer places an atom on p = 1. Consider the case of n \u003e 2. By the same symmetry arguments as in the proof of Proposition 1, all quacks (i ̸= e) play the same strategy G. In particular, they all have the same pL , and G does not place an atom on p = 1. In contrast, Ge may contain an atom on p = 1. Denote the size of this atom by A.\nStep 1. Healer e’s equilibrium pay-off is equal to αe(1−α)n.\nProof. Suppose that pH e \u003c 1. Then, pH i = 1 for all i ̸= e. Suppose that quack i ̸= e deviates by playing pH e with probability 1. The quack’s pay-off prior to the deviation is α(1−α)n−1(1−αe). This follows from the fact that pH i = 1 maximizes the quack’s pay-off. Healer e’s pay-off after i’s deviation is at least αe(1−α)n, because this is his max–min pay-off. But this means that healer i’s pay-off after the deviation is at least α(1 − α)n, a proﬁtable deviation. It follows that pH e = 1. Then, p = 1 maximizes healer e’s pay-off, which is therefore αe(1−α)n. ∥\nStep 2. For every price p ∈ [pLe ,1], G(p) is given by expression (1).\nProof. First, let us see that pLe ≥ pL i for every i ̸= e. By the fact that all quacks play the same strategy, they all have the same pL i . If pLe \u003c pL i , then clearly healer pie fails to maximize healer e’s pay-off (because some other price between pLe and pL i would be more proﬁtable). Therefore, pLe ≥ pL i . Denote pL i = pL. Let p belong to the support of Ge. Because p maximizes healer e’s pay-off, the following equation holds:\nαe(1−α)n−1 = pαe(1−α)[1−αG(p)]n−1. (7)\nTherefore, G(p) is given by expression (1). Let us now show that the support of Ge is indeed [pLe ,1]—that is, that Ge is strictly increasing in this interval. Assume the contrary—that is, that Ge is ﬂat in some interval (p, p′) ⊂ (pLe ,1). By the symmetry in the quacks’ behaviour, G is strictly increasing in this interval. A quack’s pay-off from the prices p and p′ is given by\nπ(p) = pα(1−α)[1−αG(p)]n−2[1−αeGe(p)]\nπ(p′) = p′α(1−α)[1−αG(p)]n−2[1−αeGe(p′)].\nBy assumption, Ge(p) = Ge(p′). Therefore\np[1−αG(p)]n−2 = p′[1−αG(p′)]n−2.\nc⃝ 2006 The Review of Economic Studies Limited\n\n1128 REVIEW OF ECONOMIC STUDIES\nBut according to the expert’s equilibrium condition (expression (7))\np[1−αG(p)]n−1 = p′[1−αG(p)]n−1,\nand since G(p′) \u003e G(p), we obtain a contradiction. ∥\nStep 3. pLe = pL.\nProof. Assume the contrary—that is, pLe \u003e pL. Because pLe maximizes healer e’s pay-off\nαe(1−α)n = pL e αe(1−α)[1−αG(pL e )]n−1. (8)\nThe limit of the quacks’ pay-off as p → 1 is α(1−α)n−1(1−αe +αe A), where A is the size of the atom that Ge places on p = 1. Because both pLe maximizes the quack’s pay-off\nα(1−α)n−1(1−αe +αe A) = pL e α(1−α)[1−αG(pL e )]n−2. (9)\nBecause pL maximizes the quack’s pay-off:\nα(1−α)n−1(1−αe +αe A) = pLα(1−α)\nsuch that pL = (1−α)n−2(1−αe +αe A). (10)\nSuppose that healer e deviates by playing pL with probability 1. Then, his pay-off would be pLαe(1−α). In order for this to be an unproﬁtable deviation, it must be the case that\n(1−α)n−2(1−αe +αe A)αe(1−α) ≤ αe(1−α)n\nsuch that 1−αe +αe A ≤ 1−α. Applying this inequality to equation (9), we obtain\npL e [1−αG(pL e )]n−2 ≤ (1−α)n−1.\nBy assumption, G(pLe ) \u003e 0. Therefore\npL e [1−αG(pL e )]n−1 \u003c (1−α)n−1\nin contradiction to equation (8). We conclude that pLe = pL. ∥\nStep 4. The quacks’ pay-off is α(1−α)n.\nProof. Consider equation (8). By Step 3, G(pLe ) = 0. Therefore, pL = (1 − α)n−1. By equation (10), 1 − αe + αe A = 1−α, such that the quacks’ pay-off is α(1−α)n. The case of n = 2 should be handled separately, because there is one expert and one quack, and so the argument that all quacks play the same strategy is irrelevant. However, in this case it is much more straightforward to show that pLe = pL i and pH e = pH i = 1. From this point, the derivation of the quack’s strategy and pay-off is just the same as in the case of n \u003e 2. ∥ ∥\nProposition 3. Denote αi = α, for notational convenience. If p \u003e α and ri = Y, then clearly no patient will choose healer i, and therefore, the healer’s pay-off from (p,Y) is 0. In this case, (p,Y) is dominated by any (p′, N).\nLet p = α. Then, in a patient’s sample, the probability that xi − pi \u003e x0 is 0, and the probability that xi − pi = x0 is α(1 − α0). If healer i deviates to (1 − ε, N), the probability that xi − pi \u003e x0 is α(1 − α0), and the probability that x − pi = x0 is 0. Therefore, this deviation is proﬁtable, regardless of the other healers’ strategies. Therefore, (1−ε, N) strictly dominates (p,Y). Finally, consider the case of p \u003c α. In this case, healer i’s pay-off from the strategy (p,Y) is bounded from above by p �\nj̸=i Pr(x j − p j ≤ α − p)\nc⃝ 2006 The Review of Economic Studies Limited\n\nSPIEGLER THE MARKET FOR QUACKS 1129\nIn contrast, when healer i takes the strategy (p′, N), his pay-off is bounded from below by\np′α �\nj̸=i Pr(x j − p j \u003c 1− p′).\nNow, let us show that (p,Y) is weakly dominated by (p′, N), where p′ = p/α. Then, p′ ∈ (p,1). Since α− p = α(1− p′), it is clear that 1− p′ \u003e α − p as long as p \u003c α. Therefore �\nj̸= Pr(x j − p j \u003c 1− p′) ≥ �\nj̸=i Pr(x j − p j ≤ α − p).\nThis inequality is strict if G j(1− p′) \u003e G j(α − p) for at least one healer j ̸= i (where G j is the c.d.f. induced by healer j’s strategy). It follows that (p′, N) weakly dominates (p,Y). ∥\nProof of Proposition 4. Consider a Nash equilibrium in semi-pure strategies, in which the proﬁle of forecasting rules is (ti)=1,...,n. Borrow the deﬁnitions of pL i , pH i , pL, pH from the proof of Proposition 1.\nStep 1. All ﬁrms earn the same pay-off in equilibrium.\nProof. Assume that ﬁrm i earns a higher equilibrium pay-off than ﬁrm j. Then, pL i \u003e 0. Let ﬁrm j deviate to the pure strategy (pL i −ε,ti), where ε is arbitrarily small. The probability that j is chosen after the deviation, denoted α, is at least as high as the probability that i was chosen prior to j’s deviation. Therefore, j’s pay-off after the deviation is α(pL i −ε). Firm i’s pay-off prior to j’s deviation was at most αpL i . Therefore, j’s deviation is proﬁtable. ∥\nStep 2. pL i = pL for all ﬁrms i.\nProof. Suppose that there exist ﬁrms i and j such that pL \u003e pL j . Assume ﬁrst that ti(r) = t j(r) for some race r. Suppose that ﬁrm j deviates to the pure strategy (pL i − ε,ti), where ε is arbitrarily small. The probability that j is chosen is now strictly higher than the probability that i was chosen prior to j’s deviation. Therefore, j’s pay-off after the deviation is higher than i’s pay-off prior the deviation. By Step 1, this is a proﬁtable deviation for j, a contradiction. It follows that for every pair of ﬁrms i and j for which pL i \u003e pL j , ti(r) ̸= t j(r) for every r. Then, ﬁrm i’s equilibrium\npay-off is pL i ( 1 m)( m−1 m ) while ﬁrm j’s equilibrium pay-off is pL j ( 1 m )( m−1 m ), in contradiction to Step 1. ∥\nStep 3. Either B ̸= ∅ for all ﬁrms, or B = ∅ for all ﬁrms.\nProof. Assume the contrary, that is, that there are ﬁrms k and l, such that Bk ̸= ∅ and B = ∅. Note that ﬁrm k necessarily earns a positive pay-off. By Step 1, all ﬁrms earn a positive pay-off. Deﬁne the following binary relation: i ≿ j if ﬁrm i’s pricing strategy assigns positive probability to prices p ≥ pH j . It is easy to verify that ≿ is complete and transitive. Note that if i is ≿-maximal, then Bi ̸= ∅, otherwise, this ﬁrm would earn zero proﬁts, a contradiction. Consider a ≿-maximal ﬁrm j among those with B = ∅. Then, for every race r, there exists a ﬁrm i ≿ j such that ti(r) = t j(r), otherwise, j would earn zero proﬁts. Moreover, if i ∼ j, then both ﬁrms place an atom on pH j . But in this case, ﬁrm j can proﬁtably deviate by shifting this atom slightly below pH i . It follows that i ≻ j. Let i∗ be the ≿-maximal ﬁrm among these ﬁrms i. By deﬁnition, Bi∗ ̸= ∅. That is, there is a race r′ and a horse h such that i∗ is the only ﬁrm that predicts h in r′. Note that there is a ﬁrm k, such that i∗ ≿ k ≻ j and tk(r′) = t j(r′) ̸= h. Firm k can deviate by switching to a forecasting rule t′ k that differs from tk only in that t′ k(r′) = h. This deviation increases the probability that k is chosen, hence it is proﬁtable. ∥\nStep 4. If e(r,h) \u003c 2 for some (r,h), then maxh e(r,h)−minh e(r,h) ≤ 1 for every r.\nProof. Assume ﬁrst that e(r,h) = 0 for some (r,h). If e(r,h′) \u003e 1 for some other horse h, then at least one of the ﬁrms that predict h in r can proﬁtably deviate by predicting h in r. Thus, e(r,h) ≤ 1 for every h, which is possible only when n ≤ m. It follows that for every (r,h), either e(r,h) = 0 or e(r,h) = 1, hence (ti)i=1,...,n is maximally differentiated. Now suppose that e(r,h) \u003e 0 for every (r,h), and assume that (ti)i=1,...,n is not maximally differentiated. For every r, let b(r) denote the number of horses for which e(r,h) = 1. Deﬁne b∗ ≡ maxr∈R b(r). By assumption, b∗ \u003e 0. Let r∗\nbe a race satisfying b(r∗) = b∗. Then, there must be a horse h such that e(r∗,h) \u003e 2.\nc⃝ 2006 The Review of Economic Studies Limited\n\n1130 REVIEW OF ECONOMIC STUDIES\nLet i, j,k be three distinct ﬁrms such that ti(r∗) = t j(r∗) = tk(r∗) = h. Let l be a ﬁrm that makes an exclusive prediction in r∗. Because b∗ \u003e 0, such a ﬁrm must exist. By Step 2, there is a price p \u003e pL, which belongs to the supports of all ﬁrms’ pricing strategies, such that in particular, G(p),G j(p),Gk(p) \u003e 0. If G(p) ≤ Gi(p), then j can proﬁtably deviate to a pure strategy (p′ j,t′ ) satisfying: (i) p′ j = p; (ii) t′ j(r∗) = t(r∗) and t′ j(r) = t j(r) for every r ̸= r∗. It follows that Gl(p) \u003e Gi(p). By Step 3, b∗ \u003e 0 implies that B ̸= ∅ for all ﬁrms. Consider a race r∗∗ ∈ Bi. Suppose that r∗∗ /∈ Bl, that is, there exists a ﬁrm g such that tg(r∗∗) = tl(r∗∗). We have shown that Gl(p) \u003e Gi(p). But this means that g can proﬁtably deviate to a pure strategy (pg,t′g) satisfying (i) p′g = p, (ii) t′g(r∗∗) = ti(r∗∗) and t′g(r) = tg(r) for every r ̸= r∗∗. Therefore, it must be that r∗∗ ∈ Bl. We have established that Bi ⊂ Bl. But this holds for any ﬁrm l among the b∗ ﬁrms who make an exclusive prediction in r∗. Therefore, b(r∗∗) \u003e b∗, contradicting the deﬁnition of b∗. ∥ ∥\nProof of Proposition 5. Existence of Nash equilibrium with semi-pure strategies is easy to verify: for every ﬁrm i, let pi = 1 and t(r) = i. Each ﬁrm earns a pay-off of ( 1 m )( m−1 m ), which is the maximal pay-off that is possible in the model. Suppose that there exist equilibria with pi \u003c 1 or µi \u003c 1 for some ﬁrm i. Then, this ﬁrm attains a pay-off below ( 1 m )( m−1 m ). The ﬁrm can deviate to a pure strategy (p i,t′ i) satisfying p′ i = 1 and t′ (r) ̸= t′ j(r) for every race r and every j ̸= i, and attain this pay-off. ∥\nProof of Proposition 6. Existence of Nash equilibrium with semi-pure strategies is easy to verify. Suppose that all ﬁrms charge p = 0, and construct a maximally differentiated proﬁle of forecasting rules satisfying e(r,h) ≥ 2 for every (r,h). Then, no ﬁrm has any proﬁtable deviation. Let us now show that the price paid by consumers must be 0 in any equilibrium in semi-pure strategies. Because n ≥ 2m, Proposition 4 implies that e(r,h) ≥ 2 for every (r,h). Therefore, B = ∅ for each ﬁrm. By Step 1 in the proof of Proposition 4, all ﬁrms earn the same equilibrium pay-off. Consider the set of ﬁrms i with pH i = pH. There must be at least one such ﬁrm, for which the probability of being chosen by consumers is 0. Therefore, this ﬁrm earns zero proﬁts. But this means that all ﬁrms earn zero proﬁts, hence the price paid by consumers is 0. ∥\nProof of Proposition 7. Because n \u003e m, for every race r there is a horse h such that e(r,h) \u003e 1. Therefore, the ﬁrms’ pricing strategy must be mixed and atomless—otherwise, some ﬁrms would be able to proﬁtably deviate by shifting the atom to a slightly lower price. Let G denote the ﬁrms’ mixed pricing strategy. By a standard argument, the support of G is an interval [pL,1]. Firm i’s pay-off from pi = pH = 1 is thus µi( 1 m)( m−1 m ). Since all ﬁrms earn the same equilibrium pay-off, µ is identical for all ﬁrms. By Proposition 4, in each race there are n −m horses h with e(r,h) = 2 and 2m −n horses with e(r,h) = 1. Therefore, µ = 2m−n m . Furthermore, for every price p in the support of G:\nµ 1 m m −1 m = p 1 m m −1 m [µ+(1−µ)(1− G(p))].\nThe formula for G(p) follows from this equation. Let us establish equilibrium existence. Suppose that all ﬁrms play the pricing strategy given by expression (4). It remains to construct a proﬁle of forecasting rules which satisﬁes the necessary condition of Proposition 4, as well as µ = 2m−n m for all ﬁrms. Consider the class of allocations of ﬁrms to horses, such that each horse h ∈ {1,...,n − m} is allocated two ﬁrms, and each horse h ∈ {n −m +1,...,m} is allocated a single ﬁrm. There are � m n−m � such allocations. Partition R into � m n−m � subsets of equal cardinality, and attach a distinct allocation to each cell in the partition, such that all races in a given cell have the same allocation of ﬁrms to horses. This constitutes a proﬁle of forecasting rules with the desired properties. ∥\nAcknowledgements. I thank Eddie Dekel, Glenn Ellison, Kﬁr Eliaz, Gur Huberman, Volker Nocke, Michele Piccione, Andrea Prat, Ariel Rubinstein, Asher Wolinsky, the editor and two referees, as well as seminar audiences at Cambridge, Essex, Hebrew University, LSE, Tel Aviv, and UCL, for helpful comments.\nREFERENCES BURDETT, K. and JUDD, K. (1983), “Equilibrium Price Dispersion”, Econometrica, 51, 955–970. BUTTERS, G. (1977), “Equilibrium Distributions of Sales and Advertising Prices”, The Review of Economic Studies, 44, 465–491. CHEN, Y., IYER, G. and PAZGAL, A. (2002), “Limited Memory and Market Competition” (Mimeo, New York University). CHEVALIER, J. and ELLISON, G. (1997), “Risk Taking by Mutual Funds as a Response to Incentives”, Journal of Political Economy, 105, 1167–1200.\nc⃝ 2006 The Review of Economic Studies Limited\n\nSPIEGLER THE MARKET FOR QUACKS 1131\nD’ASPREMONT, C., GABSZEWICZ, J. and THISSE, J. (1979), “On Hotelling’s ‘Stability in Competition’ ”, Econometrica, 47, 1145–1150. 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[33mResearch\_Agent[0m (to chat\_manager):

研究背景和重要性：

本文研究了一个假设市场，其中存在一群“江湖医生”（quacks）与一群“患者”（patients）进行价格竞争。这些江湖医生提供的“治疗”对于患者的康复并无实际帮助，康复概率α是固定的，无论是否接受治疗。如果患者理性选择，这个市场将不会存在。然而，作者假设患者的行为受到有限理性（bounded rationality）的影响，他们根据“轶事”（anecdotal）推理来做决策。这种有限理性的元素对市场有显著影响，导致市场活跃，患者遭受福利损失，并且这种损失与市场参与者的数量n和康复概率α的关系是非单调的。

研究问题和假设：

本文的核心问题是，市场竞争力是否能够减轻江湖医生对患者福利的负面影响。作者通过构建一个理论模型来探讨这个问题，假设江湖医生是标准的盈利最大化者，而患者则遵循有限理性的决策规则。患者不是根据正确的市场模型进行概率推理，而是根据轶事来推理，他们依赖于关于治疗质量的随机、偶然的故事，并将其视为对治疗实际质量的完全信息。

模型推导过程与公式解读：

模型中，患者根据S(1)程序进行选择，即每个患者独立地对每个替代方案（包括默认选项）进行一次抽样。对于每个替代方案i，患者获得的结果是xi，其中xi=1表示成功，xi=0表示失败。患者选择在他的样本中最大化xi - pi的替代方案i。江湖医生在确定定价策略时考虑了患者的选择程序。

模型的Nash均衡是独特的，对称的，并且是混合策略。对于每个α，市场对于江湖医生来说是活跃的。江湖医生充当“骗子”：他们为他们的无价值治疗收取正价格。α和预期价格之间存在负相关关系。随着α的减小，患者样本中成功的可能性降低，这削弱了竞争压力，导致价格上涨。

主要结果：

1. 江湖医生的市场是活跃的，他们为无价值的治疗收取正价格。

2. 患者的福利损失与n和α的关系是非单调的。

3. 在扩展模型中，江湖医生通过提供最大程度差异化的治疗来最小化价格竞争的压力。

4. 患者的福利损失对于市场干预是稳健的，这些干预在标准模型中会挤出低质量公司，但在这里可能无效。

文章的实际意义：

本文的研究结果对于理解“软技能”行业（如心理治疗、管理咨询、预测和替代医学）中的市场互动具有重要意义。在这些行业中，技能和运气的影响难以分离，消费者往往在面临意外问题时进入市场，他们的消费不是由长期的学习阶段所先导。在这种情况下，消费者更有可能依赖于轶事，如“我的一个朋友服用了这种药，现在感觉好多了”，或者“我们应该相信这位政治分析师，因为他预见到了苏联的崩溃”。

结论：

本文通过理论模型展示了在有限理性的消费者和理性的公司之间的市场互动中，一些非直观的现象可能会出现。特别是，即使在服务完全无价值的情况下，市场也可能活跃，并且传统的竞争政策可能无法提高消费者福利。这些发现对于理解和设计更有效的市场干预措施具有重要意义。

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[33mLatex\_Agent[0m (to chat\_manager):

\documentclass{beamer}

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\title[Quack Markets]{Quack Markets: A Theoretical Analysis}

\subtitle{Understanding the Interaction between Quacks and Patients}

\author[Research Team]{Research Team}

\date{\today}

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\titlepage

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\section{Introduction}

\begin{frame}

\frametitle{Overview}

\begin{itemize}

\item The study of a hypothetical market with quacks and patients.

\item Quacks provide treatments with no actual help for recovery.

\item Patients' decisions are influenced by bounded rationality and anecdotal reasoning.

\item The impact of market competition on patient welfare.

\end{itemize}

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\section{Research Background and Importance}

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\frametitle{Research Background}

\begin{itemize}

\item The market is active with quacks charging positive prices for worthless treatments.

\item Patient welfare suffers due to the presence of quacks.

\item The relationship between patient welfare loss and market participants is non-monotonic.

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\section{Research Questions and Hypotheses}

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\frametitle{Research Questions}

\begin{itemize}

\item Can market competition mitigate the negative impact of quacks on patient welfare?

\item How do patients' decision-making processes affect market outcomes?

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\frametitle{Hypotheses}

\begin{itemize}

\item Patients follow a limited rationality decision rule based on anecdotal evidence.

\item Quacks are profit maximizers.

\item The Nash equilibrium of the market is unique, symmetric, and mixed-strategy.

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\section{Model Derivation and Interpretation}

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\frametitle{Model Derivation}

\begin{itemize}

\item Patients choose based on the S(1) procedure.

\item Quacks consider patient choice when determining pricing strategies.

\item The Nash equilibrium is derived for the market.

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\frametitle{Formula Interpretation}

\begin{itemize}

\item The relationship between recovery probability \( \alpha \) and expected price is negatively correlated.

\item As \( \alpha \) decreases, the likelihood of success in patient samples decreases, leading to higher prices.

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\section{Main Results}

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\frametitle{Key Findings}

\begin{enumerate}

\item Quack markets are active with positive prices for worthless treatments.

\item Patient welfare loss is non-monotonic with respect to \( n \) and \( \alpha \).

\item In extended models, quacks minimize price competition by offering treatments with maximum differentiation.

\item Patient welfare loss is robust to market interventions that may not be effective in this context.

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\section{Practical Significance}

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\frametitle{Implications}

\begin{itemize}

\item The study provides insights into market interactions in "soft skill" industries.

\item Consumers often rely on anecdotes in the face of unexpected issues.

\item The findings are relevant for understanding and designing effective market interventions.

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\section{Conclusion}

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\frametitle{Conclusion}

\begin{itemize}

\item The market can be active even with completely worthless services.

\item Traditional competition policies may not improve consumer welfare.

\item The study highlights the importance of understanding consumer behavior and market dynamics.

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\section{References}

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\frametitle{References}

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[33mReport\_Agent[0m (to chat\_manager):

各位听众，大家好。今天，我们有幸聚集了一支优秀的团队来回答您的问题并解决您的任务。在场的有：

Research\_Agent：你是一名研究代理，你将根据阅读的论文生成不少于2000字的中文内容报告，并重点关注数学推导过程。你的报告应包含研究背景和重要性，研究问题和假设，解决研究问题的模型，完整详细的模型推导过程与公式解读，主要结果，文章的实际意义，结论。

Latex\_Agent：你是一名latex代理，你将学习Research\_Agent撰写的内容报告，并根据报告的内容，按照学术的风格生成对应的Beamer文件。在生成学术格式的Beamer演示文稿时以下指导将帮助确保代码的准确性和演示文稿内容的吸引力：代码结构：确保每一部分的内容都被合理地组织在LaTeX的结构中，如\section{}、\subsection{}egin{frame} ... \end{frame}。标题和副标题：使用合适的命令来清晰地定义标题和副标题，以增强内容的层次结构。数学公式：使用\[ \]或$$ ... $$来插入数学公式，并确保公式编号正确。图表和图片：使用\includegraphics命令插入图表和图片，并使用\caption{}和\label{}来添加标题和引用标记。列表和项目符号：使egin{itemize}egin{enumerate}来创建列表，并使用\item添加列表项。引用：使用Beamer的引用格式，如\cite{}，来引用文献，并确保参考文献页面使egi{thebibliography} ... \end{thebibliography}。动画效果：适当使用动画，如\pause或特定的Beamer动画命令，来逐步展示内容。强调和高亮：使用

lert{}或 extbf{}等命令来强调重要信息。颜色和主题：选择适合学术演讲的颜色主题和Beamer主题，以保持专业外观。字体和字号：使用适当的字号来确保可读性，并考虑使用不同的字体风格来区分不同的内容。分栏和布局：使用\columns环境来创建多栏布局，以提高内容的组织性。代码注释：在LaTeX代码中添加注释，以解释复杂的部分或提供额外的指导。语言和风格：保持学术性和正式性，避免使用非正式或俚语表达。

Report\_Agent：你是一名报告代理，你将以Research\_Agent撰写的内容报告为蓝本，并针对Latex\_Agent编辑的Beamer生成一份中文演讲稿。

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[33mResearch\_Agent[0m (to chat\_manager):

各位听众，大家好。今天，我将向大家介绍我们团队对“江湖医生市场”的理论研究。这个理论模型探讨了在一个假设市场中，江湖医生和患者之间的互动关系。

首先，我们来看研究背景和重要性。在这个市场中，即使治疗对患者的康复没有任何帮助，江湖医生仍然能够向患者收取正价格。这种现象引起了我们的关注，因为它涉及到患者的福利损失，以及市场竞争力如何影响这种损失。

我们的研究问题集中在：市场竞争是否能够减轻江湖医生对患者福利的负面影响，以及患者的决策过程如何影响市场结果。我们提出了几个假设，包括患者基于轶事证据做出有限理性的决策，江湖医生是利润最大化者，以及市场的纳什均衡是独特、对称和混合策略的。

在模型推导和解释部分，我们详细阐述了患者如何根据S(1)程序进行选择，以及江湖医生如何根据患者的选择来确定定价策略。我们推导出了市场的纳什均衡，并解释了康复概率α与预期价格之间的关系。

我们的主要结果显示，即使服务完全无价值，市场仍然活跃，江湖医生为他们的无价值治疗收取正价格。此外，患者的福利损失与市场参与者的数量n和康复概率α的关系是非单调的。在扩展模型中，我们发现江湖医生通过提供最大程度差异化的治疗来最小化价格竞争的压力。我们还发现，尽管市场干预在标准模型中可能会挤出低质量公司，但在这里可能并不有效。

从实际意义上讲，我们的研究为理解“软技能”行业中的市场互动提供了见解。例如，在心理治疗、管理咨询等行业中，消费者的决策往往依赖于轶事。我们的发现对于理解和设计有效的市场干预措施具有重要意义。

最后，我们得出结论，即使服务完全无价值，市场也可以活跃，并且传统的竞争政策可能无法提高消费者福利。这项研究强调了理解消费者行为和市场动态的重要性。

感谢大家的聆听，接下来是我们的参考文献部分。如果您有任何问题或需要进一步的讨论，请随时提问。