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WORKING PAPER SERIES NO. 36 (2009)

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Abstract

This paper analyzes the implications of the inherent conflict between two tasks performed by direct marketing agents: prospecting for customers and advising on the product's "suitability" for the specific needs of customers. When structuring sales-force compensation, firms trade off the expected losses from "misselling" unsuitable products with the agency costs of providing marketing incentives. We characterize how the equilibrium amount of misselling (and thus the scope of policy intervention) depends on features of the agency problem including: the internal organization of a firm's sales process, the transparency of its commission structure, and the steepness of its agents' sales incentives.

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When purchasing unfamiliar products, consumers often rely on information and advice provided by representatives of the seller. This creates the possibility of "misselling," the questionable practice of a salesperson selling a product that may not match a customer's specific needs.[1] This problem is particularly severe in markets for technically complex products, such as consumer electronics, auto repairs, medical services, and retail financial products including securities, pensions, insurance policies, and mortgages. An important feature of these markets is that the seller often deals with the customer through an agent, rather than directly.

For example, brokers typically recommend purchase of a specific product after inquiring about their customers' particular circumstances and needs. The possibility of abuse has led to regulation in some of these markets, most notably for securities transactions. The Financial Industry Regulatory Authority (FINRA, the major self-regulatory organization for securities firms operating in the United States) mandates that brokers-dealers make a reasonable effort to obtain information about the individual characteristics of their (non-institutional) customers and to ensure that their recommendations are "suitable" to customers' financial situations and needs.[2] Firms that make unsuitable recommendations are sanctioned through FINRA disciplinary procedures.[3]

[1] The code of conduct for the employees of a major bank ('Group Code of Conduct: Leading by Example,' Standard Chartered Bank, 2005) reports the following apt illustration: "Typically, mis-selling is associated with investment products when there may have been a failure to disclose all the associated risks or where an investment product is inappropriate to a customer's needs. For example, a product with a long tenor [*sic*] (eg ten years) may have a guaranteed repayment of principal only on maturity date, but if prematurely liquidated it may not repay the full principal. This may result in mis selling if it is sold to customer who may have had a short term need for cash or to a customer who is 70 years old."

[2] FINRA was formed in 2007 through a consolidation of the enforcement arm of the New York Stock Exchange, NYSE Regulation, Inc., and the National Association of Security Dealers (NASD). NASD Conduct Rule 2310(a) 'Recommendation to Customers (Suitability),' originally adopted in 1939, prescribes: "In recommending to a customer the purchase, sale or exchange of any security, a member shall have reasonable grounds for believing that the recommendation is suitable for such customer upon the basis of the facts, if any, disclosed by such customer as to his other security holdings and as to his financial situation and needs." Added in 1991, Rule 2310(b) 'Broker's Duty of Inquiry' further requires: "Prior to the execution of a transaction recommended to a non-institutional customer, other than transactions with customers where investments are limited to money market mutual funds, a member shall make reasonable efforts to obtain information concerning: (1) the customer's financial status; (2) the customer's tax status; (3) the customer's investment objectives; and (4) such other information used or considered to be reasonable by such member or registered representative in making recommendations to the customer." In addition, Rule 3010 imposes a duty of supervision on the firm employing the broker-dealer.

[3] According to Lewis Lowenfels and Alan R. Bromberg (1999), "unsuitability claims are the most common and yet the most ambiguous of all customer claims." Regulatory bodies may, in addition, support customers who claim compensation. Such compensation can be substantial, as witnessed by recent high-profile misselling scandals following the liberalization of the U.K. financial industry in the 1980s. After a full review of private pension sales in 1994, financial institutions reportedly paid out a total compensation

This paper analyzes the possibility of misselling through the lens of the agency relationship between the selling firm and its salesforce. We argue that the risk of misselling is particularly acute when the firm hires the same agents to both prospect for new customers and provide product advice. When the firm provides steeper incentives—for example, because the presence of more firms makes it harder for agents to locate new customers—then agents will be more tempted to inflate the perceived value of the product, or to recommend purchase even if the product is inappropriate for the customers they identify.

At the heart of our model lies a multi-task problem that is inherent to the practice of direct marketing. An agent who markets a product directly to customers must first *prospect* for potential customers and interest them in the product, and second *advise* customers on the suitability of the product (including the provision of accurate information). The incentives necessary to induce search effort subsequently tempt the agent to advise purchase indiscriminately.

Firms that missell through their own employees may be held vicariously liable or may damage their reputation with customers. Similarly, when misselling takes place through independent intermediaries, firms risk being sued or facing regulatory sanctions (including loss of license). Therefore, firms should have a vital interest in ensuring that their agents comply with the chosen standard of advice. However, ensuring compliance is costly for the firm, as it may require internal reviews or result in rents for the agents.[4] Through the use of contingent commissions, which are clawed back in cases of alleged misselling or when dissatisfied customers cancel a contract, the resulting agency cost to the firm can be reduced.[5]

We show that an agent's expected cost of prospecting for customers, the internal organization of a firm's sales process, and the transparency of the commission structure all affect the firm's *own* tolerance towards misselling. Importantly, it is only through the agency

of £12 billion. Compensation is still being paid for the misselling of endowment mortgages, which bundle mortgages with risky investments. See also footnote 22.

[4]Sellers can use a number of internal controls to monitor agents and to limit their discretion when making recommendations to customers. For example, sellers use internal compliance officers and Customer Relationship Management (CRM) systems to regularly audit their agents' "fact finds." The audit trail for the transaction allows the seller to monitor the agent's performance more easily and to resolve disputes over allegations of misselling.

[5]In an extension of the baseline model, we show that agency costs may be limited further if advisers are relieved (to some extent) of the task of prospecting for customers (for example, when bank managers are only advising incoming clients in a bank's local branch, while client traffic is driven by the bank's marketing campaign).

relationship that these factors affect the potential for misselling. Casting the firm as an entrepreneurial entity instead—akin to a self-employed lawyer or doctor, as in the extant literature on credence goods—overlooks the role played by these factors. As we argue, this could be particularly problematic in evaluating the scope of possible policy intervention, say through imposing regulations or probing into cases of alleged misselling. In addition, while the presence of the internal agency problem strengthens the case for intervention, it also calls for policymakers and regulators to adopt a more fine-tuned approach—for example, by adapting their response to the organization of the sales process and the prevailing intensity of competition.

In our model, the price of the product is determined endogenously. On the one hand, the suitability standard that customers expect to prevail affects the maximum price they are willing to pay. On the other hand, the price also affects the firm's incentives to expand sales by tolerating a lower suitability standard. Even though customers do not observe the agent's incentives in our baseline scenario, they have correct expectations in equilibrium about the commission structure and the resulting suitability standard.

Given that the expectation of misselling reduces customers' willingness to pay, the firm would benefit *ex ante* from committing to pay *ex post* penalties for misselling. Firms might be able to achieve some commitment through self-regulatory organizations, such as FINRA.[6] However, we show that even when firms have the same commitment power as a policymaker, the suitability standard set under self-regulation is still too low from a welfare perspective. In addition to imposing penalties for misselling, regulators could mandate disclosure of the commissions paid to agents, as is becoming increasingly common in some countries and markets.[7] We show that the disclosure of commissions partly deters firms from lowering their standards. When observing that the firm offers less steep incentives to the agent, customers are reassured that the suitability standard has increased; hence, they are willing to pay more, to the benefit of the firm.

As more financial decisions end up in the hands of consumers, for example with the shift from defined benefit pension plans to 401(k) plans in the United States, regula-

[6]While SEC regulation requires that all brokers-dealers belong to a self-regulatory organization, in other markets membership in such organizations is voluntary. For example, insurance brokers can apply for membership in the Insurance Marketplace Standards Association (IMSA), a voluntary self-regulatory organization active in setting and enforcing ethical standards for the sale of individual life insurance, long-term care insurance, and annuities.

[7]See Section 6.

tors are grappling with the interaction between product providers, advising agents, and consumers—Howell E. Jackson's (2007) "trilateral dilemma."[8] As is common for the retailing of financial services, the U.S. mortgage industry also relies heavily on third-party agents.[9] In the context of our model, we analyze how agents' compensation and suitability standards change as firms resell contracts (such as loans)—a practice that is currently attracting regulators' attention. It remains to be seen how courts and policymakers will deal with the fallout from the recent turmoil in the subprime mortgage market.

Beyond financial and insurance services, our model applies more broadly to situations in which marketing agents are tempted to inflate the perceived value of products.[10] For instance, a salesperson may praise certain features but hide others when trying to convince a client to switch to a particular calling plan, or utility contract, either of which may be sufficiently complex to make such deception successful.[11]

The rest of the paper is organized as follows. Section 1 reviews the related literature. Section 2 formulates the baseline model. Section 3 characterizes how the firm should optimally compensate the agent. Section 4 analyzes the equilibrium that results when the customer does not observe the agent's compensation. Section 5 discusses the effect of agency on the equilibrium outcome and on the scope for policy intervention. Section 6 turns to the equilibrium when the agent's compensation scheme is transparent. Sections 7 to 9 extend the model to investigate the role of the internal organization of the sales process, the possibility of contract resale, and the effect of changes in the amount of competition for customers. Section 10 concludes. Appendix A presents a toy model of the

[8] Legal scholars are paying increasing attention to the role of contingent commissions and premiums in the form of yield spread premiums to mortgage brokers, brokerage commissions in investment management, contingent insurance commissions, or fees and kickbacks in real estate settlement transactions. These commissions are feared to tempt advisors to "steer" clients to unsuitable products. See, for instance, Jackson and Laurie Burlingame (2007) and, with a particular focus on contingent commissions, Daniel Schwarcz (2007).

[9] In a comment on the causes of the current subprime mortgage crisis, *The Economist* observes that "[m]any [customers] appear to have been encouraged to take out loans by brokers more bothered about their fees than their clients' ability to repay their debts" and that "[m]any of the riskiest mortgages were made by independent, non-bank lenders." ('The trouble with the housing market' (page 11) and 'America's housing market' (page 79), March 24, 2007.)

[10] Section 2-315 of the U.S. Uniform Commercial Code requires that: "Where the seller at the time of contracting has reason to know any particular purpose for which the goods are required and that the buyer is relying on the seller's skill or judgment to select or furnish suitable goods, there is unless excluded or modified under the next section an implied warranty that the goods shall be fit for such purpose."

[11] See the discussion by the U.K. telecommunication regulator in 'Migration, Switching and Mis-selling,' Consultation Document, Office of Communications, February 16, 2006.

two-task agency problem on which the baseline model developed in the paper builds. All proofs are collected in Appendix B.

1 Literature

This paper contributes to the analysis of optimal compensation for a direct marketing agent who must be incentivized simultaneously to sell and *not* to missell. When analyzing the optimal compensation structure (salary and commission) for sales agents, the marketing literature has traditionally focused on the classic trade-off between risk-sharing and incentives (see Amiya K. Basu, Rajiv Lal, V. Srinivasan, and Richard Staelin, 1985). A notable exception is Ajay Kalra, Mengze Shi, and Kannan Srinivasan (2003), who model a firm's ability to signal product quality to customers through the (observable) choice of commission paid to its salesforce. In our model instead, the sales agent has private information about the match of the product with customer needs, whereas the firm does not have direct access to this information.

Our model hinges on the conflict between a sales agent's incentives to prospect for customers and to provide adequate advice. The compensation needed to elicit effort on one task (prospecting for customers) creates a conflict of interest between the firm and the agent on the second task (providing adequate advice). This conflict generates a multi-task agency problem (Bengt Holmström and Paul Milgrom, 1991), analogous to the problems analyzed in different environments by Steven D. Levitt and Christopher M. Snyder (1997) and Mathias Dewatripont and Jean Tirole (1999).[12]

An important ingredient of our model is the communication game between the agent and the customer. In our setting, the conflict of interest between agent and customer arises endogenously from the agent's compensation set by the firm. In most of the literature on strategic information transmission and delegation (e.g., Vincent Crawford and Joel Sobel, 1982, Wouter Dessein, 2002, and Ricardo Alonso and Niko Matouschek, 2008), this preference divergence is given exogenously.[13]

[12] See Section 6.2 in Patrick Bolton and Dewatripont (2005) for an exposition of the multi-task problem, and in particular Section 6.22 for an application to incentives for selling two imperfectly substitutable products.

[13] Other models that analyze "delegated expertise" are Richard A. Lambert (1986), Joel S. Demski and David E.M. Sappington (1987), Tracy R. Lewis and Sappington (1997), Luis Garicano and Tano Santos (2004), and Denis Gromb and David Martimort (2007). Furthermore, a trade-off between high-powered incentives to induce effort and biased decision-making is also analyzed in Susan Athey and John Roberts

Our assumption that the principal (the firm) bears responsibility for the actions of its agents has been investigated more broadly in the literature on vicarious liability (see for example Rohan Pitchford, 1995, and Yeon-Koo Che and Kathryn E. Spier, 2006). More generally, our paper analyzes policy intervention when the targeted action—the quality of advice in our setting—is not carried out directly by the targeted firm, but rather it is delegated to agents. As we find, consideration of the firm's *internal* agency problem is crucial to determining the role for policy intervention.

Consideration of the firm's agency problem is novel to the literature on credence and experience goods, following Michael R. Darby and Edi Karni (1973).[14] In their analysis of information provision incentives by sellers of financial products, Bolton, Xavier Freixas, and Joel Shapiro (2007) compare the performance of different organizational structures (one-stop versus universal banking), but they do not consider the agency problem that is internal to the selling firm. When analyzing the choice of anti-fraud standards by a self-regulatory organization, Peter M. DeMarzo, Michael J. Fishman, and Kathleen M. Hagerty (2005) also abstract from the agency problem between the seller and its agents. By focusing on this agency problem, we highlight the two-way interaction between the internal organization of the sales process and the regulatory framework.[15]

2 Model

Consider a risk-neutral firm selling a single product through a risk-neutral agent who is asked to both prospect for customers and advise them. The agent is protected by limited liability, and hence can only receive positive compensation from the firm. By exerting sales effort at private disutility $c_S > 0$, the agent contacts a potential customer with probability $\mu > 0$.[16]

(2001) and Dessein, Garicano, and Robert Gertner (2006).

[14] See Uwe Dulleck and Rudolf Kerschbamer (2006) for a recent survey of the theoretical literature. In an empirical study of the vehicle inspection market, Thomas N. Hubbard (1998) shows that customers are less likely to obtain a favorable inspection at chain stores than at independent garages, service stations, new-car dealers, and tune-up shops. His evidence is consistent with firms acting less in customers' interests when the agency problem is more severe.

[15] In their factual account of the U.K. pension misselling scandal, Julia Black and Richard Nobles (1998) also stress this interaction, which works from regulation and policy to firms' optimal strategy choice and vice versa.

[16] Think of the agent as either contacting previous clients or prospecting for new customers. The cost c_S may be required to make customers aware of the existence of the (possibly new) product.

In addition, the agent assists customers in deciding whether the product (or service) is suitable for their specific needs. To capture the uncertainty about the match between customer preferences and product characteristics, we stipulate that there are two customer *types*, $\theta = l, h$. A customer of type θ derives utility u_θ from acquiring the product, with $u_l < 0 < u_h$.[17] We allow for the firm's cost of serving the customer, $k_\theta > 0$, to be type dependent.[18] Given this specification, a sale made to a type-l customer results in both net loss for the customer and inefficiency from a welfare perspective.

The prior probability that $\theta = h$ is given by $0 < q < 1$, which is also the only information the customer has about the type. The agent privately observes a noisy *pre-sale signal* $s \in [0, 1]$ about the customer's type.[19] Without further loss of generality, we stipulate that s is realized according to the type-dependent distribution functions F_θ, where F_h dominates F_l in the Monotone Likelihood Ratio (MLR) order. We assume that the densities $f_\theta(s)$ are continuous and strictly positive in the interior $s \in (0, 1)$, so that the posterior probability $q(s) = \Pr[\theta = h \mid s]$ is strictly increasing. Assuming further that $f_h(1) > 0$, $f_l(0) > 0$, and $f_h(0) = f_l(1) = 0$, the signal is fully informative at the boundaries: $q(0) = 0$ and $q(1) = 1$. It is convenient to define $F(s)$ as the unconditional distribution of the signal, with density $f(s) := qf_h(s) + (1 - q)f_l(s)$.

When contracting with the agent, the firm cannot condition directly on the agent's effort or the customer's type, because the firm does not observe them. Instead, the firm can condition the agent's compensation first on whether a sale has been made, and second on a *post-sale signal* about the customer's type. We specify that the post-sale signal reveals with probability $0 < \psi < 1$ whether a sale was made to a type-l customer. For instance, the signal could originate from the complaints of disgruntled customers. In this case, ψ corresponds to the conditional probability with which a sale to a type-l customer results

[17] Utilities are taken to be net of the respective next-best option. For instance, retail investment products may have a particular risk-return profile that is not optimal for all investors. Likewise, one product may create a particular tax advantage, though possibly at the cost of higher risk.

[18] As discussed in more detail in Section 8, the firm's margin naturally depend on the customer's type for some financial products (such as mortgages or insurance contracts) and long-term service contracts (such as calling plans or utility services—cf. footnote 11). The condition $k_l > k_h$ may have particular relevance for financial products such as mortgages (see footnote 47). The case with $k_l < k_h$ may be applicable to insurance products, where type-h customers could represent high-risk customers, who are more likely to receive the contractually stipulated (pooling) indemnity. Finally, the case with $k_\theta = k$ should apply to most physical goods.

[19] Because this is not key to our analysis, we also specify for the moment that this information is available to the agent at no additional cost. See, however, Section 7.

in a verifiable complaint.[20]

A key parameter in our model is the expected penalty, ρ, that the firm incurs from (mis)selling to a type-l customer.[21] This parameter captures the legal costs and the fines following prosecution for misselling, comprising compensation that must be made to customers. In addition, the firm may suffer a loss in reputation following alleged misselling. In regulated sectors, the firm may face the risk of losing its license, being brought under closer regulatory scrutiny, or being less able to successfully contest future disciplinary actions for alleged misconduct.[22] Note that because the signal s is noisy, even draconian punishment (high ρ) could not ensure that only type-h customers will purchase. Instead, because the firm can be sure to sell only to type-h customers if and only if $s = 1$, the firm would close down its business if ρ were sufficiently high.[23]

We stipulate that a fraction $0 \leq \eta \leq 1$ of ρ represents a compensatory transfer to the customer. All of our results hold irrespective of the choice of η.

The timing is as follows:

1. The firm sets the product price, p.
2. The firm sets the compensation scheme for the agent.
3. The agent chooses whether to exert effort to prospect for a customer.
4. If the agent exerts effort, then a customer arrives with probability μ.
5. The agent privately observes signal s about the customer's type.
6. The agent advises the customer whether to purchase.
7. The customer decides whether to purchase at price p.
8. Conditional on a sale to a type-l customer, the firm observes a negative signal with probability ψ.
9. Conditional on a sale to a type-l customer, the firm pays an expected penalty ρ, a fraction η of which is rebated to the customer.

A key building block of the model is the communication game between the agent and

[20] In footnote 29 we argue that our results are robust to alternative specifications of the monitoring technology, provided that the post-sale signal is noisy.

[21] The likelihood that disgruntled customers lodge complaints, or that sufficient information of alleged misselling surfaces, may be low. Still, ρ may be substantial if the imposed penalty is sufficiently large.

[22] As explained by Lowenfels and Bromberg (1999), FINRA and SEC suitability rules constitute an "ethical standard of due care and fair dealing between brokers and customers." Broker-dealers members who violate NASD Conduct Rule 2310 (see footnote 2) are fined and suspended. Customers may obtain private damages only by demonstrating fraud or breach of fiduciary duty, which typically implies a more stringent burden of proof.

[23] In Section 5 we endogenize the choice of ρ.

the customer that takes place at stages 5–7. The agent's preferences depend on the firm's compensation scheme and thus will reflect the preferences of the firm. However, when $k_l + \rho \leq k_h$ holds, firm and customer interests are completely misaligned: the firm benefits (weakly) more when selling to type-l customers, while type-h customers benefit strictly more from a purchase. In this case, there is no equilibrium in which the customer follows the agent's advice. We therefore stipulate for now that $k_l + \rho > k_h$.[24] We will show that in this case the agent's recommendation results in the customer purchasing the product whenever $s \in [s^*, 1]$, where we refer to s^* as the *suitability standard*.

By choosing the compensation scheme at stage 2, the firm effectively induces the agent to implement a particular suitability standard. Following Grossman and Hart's (1983) two-stage approach, Section 3 characterizes the firm's agency costs associated with any given suitability standard. Section 4 then turns to the determination of the optimal standard.[25]

3 Agency Cost of Suitability

This section characterizes the compensation scheme that induces a direct marketing agent to implement a given suitability standard s^*. We show that to implement a suitability standard $s^* > 0$, the seller must leave a positive rent to the agent—this rent corresponds to the agency costs associated with the standard.

3.1 Incentive Constraints

The agent is protected by limited liability and has an outside option wage of zero. As shown in Proposition 1, it is optimal for the seller to pay a zero wage when the post-sale signal indicates a type-l customer.[26] That leaves two compensation levels for the other two verifiable states: a wage of w if no sale is made, and a wage of $w + b$ if a sale is made

[24] See also Section 5.

[25] The chosen formulation where the agent observes a continuous pre-sale signal allows us to capture the firm's strategy by a continuously chosen standard and to examine how the equilibrium standard depends on the model's parameters. Readers who are less familiar with the underlying multi-task agency problem may wish to first consult Appendix A, which analyzes a toy version of the model in which the agent is perfectly informed about the customer's type.

[26] The result is not fully obvious because, in order to incentivize the agent to prospect for customers, the firm could pay a positive commission irrespective of whether a sale was subsequently contested (as it is indeed optimal when implementing $s^* = 0$). However, specifying a wage of zero when the post-sale signal indicates a type-l customer allows the firm to implement a given suitability standard $s^* > 0$ at lower overall wage costs. See the proof of Proposition 1.

and no negative post-sale signal is received. We refer to w as the agent's base *salary* and to b as the agent's additional *commission* (or bonus) for a sale.

From an uncontested sale, the agent obtains the commission b in addition to the salary w. In contrast, the agent's payoff is 0 when a sale is contested, which happens with probability $\psi\left[1-q(s)\right]$.[27] Conditional on observing signal s, the agent's expected compensation from a sale is then $V(s) := \left[1-\psi\left[1-q(s)\right]\right](w+b)$.

As long as $w+b>0$ holds, which is clearly necessary to incentivize effort, $V(s)$ is strictly increasing in s. It is also continuous in s. If $V(0)<w$ and $V(1)>w$ hold, there exists a cutoff signal s^* at which the agent is indifferent between making a sale or not: $V(s^*)=w$. Substituting from the definition of $V(s)$ and rearranging terms, this requirement becomes

$$\frac{b}{w}=\frac{\psi\left[1-q(s^*)\right]}{1-\psi\left[1-q(s^*)\right]}. \tag{1}$$

The ratio of commission to salary, b/w, must be lower if the firm wants to ensure compliance with a higher standard s^*. A higher commission b pushes s^* down because it induces the agent to advise more customers to purchase the product. In contrast, a higher salary w pushes s^* up because the agent is sure to obtain the salary w when advising a customer not to purchase, but risks losing it otherwise. For a given standard s^*, condition (1) can be satisfied with a lower salary w if a sale to a type-l customer is detected with a higher probability ψ.

We turn now to the agent's incentive constraint for prospecting for customers. By exerting sales effort at private cost c_S and subsequently applying a standard s^*, the agent realizes a sale with probability μ times $1-F(s^*)$. Again noting that the agent earns the salary w even without a sale, the agent's incentive constraint at stage 3 becomes

$$\mu\int_{s^*}^{1}\left[V(s)-w\right]f(s)ds\geq c_S. \tag{2}$$

To make exerting effort worthwhile to the agent, there must be a sufficiently large wedge between the expected compensation from a sale and the salary.

A key feature of this model is that the firm cannot compensate the agent independently for the two tasks that are governed by the two incentive conditions in (1) and (2). The agent may not sell to a customer for two reasons: either the agent failed to prospect for

[27] Our results are easily extended to the case in which only a strictly positive fraction $\alpha>0$ of the respective compensation $w+b$ can be withheld or clawed back.

a customer (which is a bad signal about the agent's search effort), or the agent found a customer and correctly advised against purchase (indicating proper search and advice). This attribution problem creates a conflict between the tasks of searching and advising.

3.2 Optimal Compensation

For a given choice of standard s^*, the optimal compensation contract (w, b) minimizes the firm's wage costs. It follows immediately from optimality that the incentive constraint (2) must be binding. This can then be rewritten as

$$\int_{s^*}^{1} [V(s) - w]\, f(s)ds = \Delta := \frac{c_S}{\mu}, \tag{3}$$

where Δ represents the agent's *expected* cost to locate a single potential customer, given that the agent's effort leads to a contact with probability μ. The higher Δ, the more incentives the firm must provide to induce the agent to exert effort.

Substituting (1) into (3), we can solve for the compensation scheme.

Proposition 1 *To ensure the agent's compliance to some standard $s^* > 0$, the firm's optimal incentive scheme prescribes the base salary*

$$w = \frac{\Delta\,[1 - \psi\,[1 - q(s^*)]]}{\psi \int_{s^*}^{1} [q(s) - q(s^*)]\, f(s)ds} \tag{4}$$

and the sales commission

$$b = \frac{\Delta\,[1 - q(s^*)]}{\int_{s^*}^{1} [q(s) - q(s^*)]\, f(s)ds}. \tag{5}$$

Because of the conflicting responsibilities of prospecting and advising, when $s^* > 0$ the agent obtains a positive rent equal to the salary w, which the agent can always secure, even without exerting sales effort. The firm's *expected* wage cost thus equals $c_S + w$, comprising the agent's expected compensation c_S for sales effort and the rent w. To implement the standard $s^* = 0$ instead, the firm would pay the agent a compensation equal to c_S/μ following a sale, regardless of the post-sale signal, thereby leaving no rent to the agent.[28]

[28] Consequently, under this contract the agent strictly prefers to make a sale for any observed signal. In contrast, if we take the limit $s^* \to 0$ for the contract characterized in Proposition 1, then the agent is by construction made indifferent betwen advising in favor of or against a purchase after observing $s = 0$. Unless monitoring is perfect with $\psi = 1$, this implies that the respective agency costs w are strictly bounded away from zero as $s^* \to 0$.

Proposition 2 *The agent's rent, w, increases in the suitability standard s^*, increases in the agent's expected sales cost Δ, and decreases in the quality ψ of the post-sale signal. The firm's marginal cost of raising the standard, dw/ds^*, is strictly decreasing in ψ and strictly increasing in Δ.*

An increase in the suitability standard affects the agent's incentives to prospect for customers and to advise them. When the suitability standard is higher, any customer contacted by the agent is less likely to purchase. To satisfy (3), the firm therefore must increase the commission b for any given salary w. As we know, however, increasing the ratio b/w would work in the *opposite* direction, namely towards a reduction in s^* (cf. (1)). Consequently, to induce a higher standard s^* the firm must increase both the commission and the salary. Likewise, when it becomes more difficult to locate potential customers as Δ increases, a strictly higher commission is needed to incentivize the agent to exert effort. Unless the firm also increases the salary and keeps the ratio b/w unchanged, this would lead to a lower suitability standard. In addition, an increase in Δ increases the firm's *marginal cost* of further raising the standard, $dw/ds^* > 0$. Finally, the firm's costs from ensuring compliance to a given standard also depend on the effectiveness of monitoring, ψ. As ψ increases, both the total costs, w, and the marginal cost of ensuring compliance to a higher standard, dw/ds^*, decrease.[29]

4 Misselling in Market Equilibrium

This section analyzes the baseline version of the model in which the customer does *not* observe the agent's compensation scheme, set at stage 2.

The firm chooses the suitability standard by trading off the benefits from a sale (net of the expected *ex post* losses associated with misselling) with the agency costs of inducing

[29] This comparative statics result also holds with alternative specifications of noisy monitoring technologies. For example, suppose the firm reviews a fraction γ of all sales, which correctly identifies a type with probability $1/2 < \varphi < 1$. (For example, the U.K. Financial Service Authority recommends as good practice the case where a firm commits to having a compliance officer check a fixed fraction of all sales.) In this case, it turns out to be optimal to pay zero compensation not only if a check was performed and indicated a sale to a type-l customer, but also if a check was not performed. The optimal base salary paid when no sale is made is then

$$w = \frac{\Delta \left[\varphi q(s^*) + (1-\varphi)\left[1 - q(s^*)\right]\right]}{(2\varphi - 1)\int_{s^*}^{1}\left[q(s) - q(s^*)\right] f(s) ds},$$

which, although independent of γ, is now strictly decreasing in the informativeness φ. As also $d^2w/dsd\varphi < 0$ holds, the comparative analysis in Proposition 2 survives with respect to φ.

the agent to uphold the standard. Given that customers do not observe the firm's compensation scheme, and thus the actual choice of the standard, their willingness to pay for the product depends on the standard they anticipate will prevail. This tempts the firm into reducing the actual standard, thereby increasing the chance of a sale as well as reducing the costs that arise from the internal agency problem.

To characterize the equilibrium, we proceed in three steps. First, we obtain the suitability standard at which the seller is willing to sell, given the customer's willingness to pay. Second, we derive how the customer's willingness to pay for the product depends on the suitability standard the customer expects the seller to implement. Third, we characterize the equilibrium, in which the customer correctly expects the standard that the seller actually enforces through the choice of compensation scheme.

4.1 Firm's Willingness to Sell

By setting the compensation for the agent at stage 2, the firm indirectly chooses the suitability standard at which it is willing to sell. The firm's conditional payoff (gross of compensation) if a sale is made at price p after the agent observes s is given by $\pi(s) := p - q(s)k_h - [1-q(s)](k_l+\rho)$. This takes into account the possibly type-dependent costs of serving the customer, k_θ, as well as the expected penalty ρ for selling to a type-l customer. We denote the firm's expected gross profits by $\Pi_G := \mu \int_{s^*}^{1} \pi(s) f(s) ds$ and its net (of wages) profits by $\Pi := \Pi_G - c_S - w$.

Holding p fixed, for $0 < s^* < 1$ the firm's first-order condition with respect to s^*, $d\Pi_G/ds^* = dw/ds^*$, becomes more explicitly

$$-f(s^*)\mu\pi(s^*) = \frac{dw}{ds^*}. \tag{6}$$

From Proposition 2 we know that the right-hand side of (6) is strictly positive, because it is more costly for the firm to ensure compliance to a higher standard s^*.[30] At the optimally implemented standard s^*, the firm realizes a net loss on the marginal sale: $\pi(s^*) < 0$. However, implementing a standard that is below the *ex post* optimal level reduces the costs incurred to incentivize the agent, and it is therefore optimal from an *ex ante* perspective.

[30] For an explicit derivation of the derivative dw/ds^* see the proof of Proposition 2.

Abstracting for now from the corner solution with $s^* = 0$, we assume that the firm's program is strictly quasi-concave, so that the first-order condition is also sufficient and pins down a unique interior solution, $\widehat{s}^*$.[31] Although this is a continuous function of all parameters of the model, it sometimes will be useful to stress the dependence on the price p by writing $\widehat{s}^*(p)$.

Recall that from Proposition 2 the marginal cost of raising the standard, dw/ds^*, is strictly higher when sales incentives have to be heightened (because of an increase in Δ) or when monitoring becomes less effective (because of a decrease in ψ). Consequently, the optimal standard is strictly lower if the agent's sales incentives are higher or if monitoring is less effective.[32] Next, $\widehat{s}^*$ is strictly lower as it becomes more profitable to expand sales by lowering s^*, which is the case if either the price p increases or the penalty ρ decreases.

Lemma 1 *Holding all else constant, including a customer's anticipated standard s^*, the standard above which the firm is willing to sell, $\widehat{s}^*$, is continuous and monotonic with $d\widehat{s}^*/dp < 0$, $d\widehat{s}^*/d\rho > 0$, $d\widehat{s}^*/d\Delta < 0$, and $d\widehat{s}^*/d\psi > 0$.*

4.2 Customer's Willingness to Pay

Next, we turn to the advice game that takes place at stages 5–7. Recall that the customer is uninformed about the payoff from purchasing the product, while the agent has a noisy signal about it. When expecting the firm to choose a compensation scheme that induces a standard s^*, the customer is willing to pay the conditional expected utility

$$\widehat{p}(s^*) := \int_{s^*}^{1} u(s) \frac{f(s)}{1 - F(s^*)} ds, \tag{7}$$

where $u(s) := q(s)u_h + [1 - q(s)](u_l + \eta\rho)$. Recall that the fraction $0 \leq \eta \leq 1$ of the firm's expected penalty ρ represents compensation to the customer if u_l is realized.

Provided that $p \leq \widehat{p}(s^*)$ holds, the customer is thus willing to follow the agent's advice and buy. In what follows, we restrict our attention to the informative equilibrium of this cheap-talk game. As is well known, there also exists an uninformative equilibrium in which

[31] While $\widehat{s}^* < 1$ follows immediately, for high p a corner solution with $\widehat{s}^* = 0$ could arise. We return to this issue in footnote 36.

[32] Having assumed strict quasiconcavity, with $0 < \widehat{s}^* < 1$ this follows immediately from implicitly differentiating the first-order condition (6).

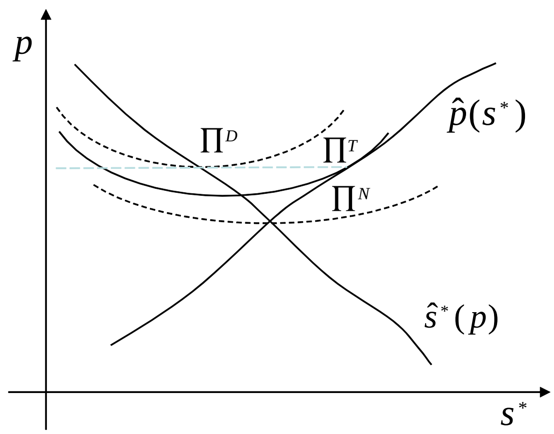

Figure 1: EQUILIBRIUM AND EFFECT OF TRANSPARENCY OF COMMISSIONS

the customer expects the agent to make the same recommendation regardless of the signal. In this case, the advice stage would be superfluous.[33]

From (7), it follows immediately that when the seller is expected to enforce a more stringent standard, the customer is willing to pay more for the product. This is also the case if a larger compensatory transfer is made.

Lemma 2 *The customer's willingness to pay for the product, $\widehat{p}(s^*)$, is continuous and monotonic with $d\widehat{p}/ds^* > 0$, $d\widehat{p}/d\rho > 0$ for $\eta > 0$, and $d\widehat{p}/d\eta > 0$ for $\rho > 0$.*

4.3 Equilibrium

At stage 1, it is optimal for the firm to charge a price equal to the customer's willingness to pay $\widehat{p}(s^*)$, given in (7). A unique equilibrium thus is pinned down by the following two requirements: that the firm sets the maximum feasible price $p = \widehat{p}(s^*)$ under the anticipated standard and that the anticipated standard s^* is indeed subsequently optimal for the firm as $s^* = \widehat{s}^*(p)$. This is illustrated in Figure 1 as the intersection of the customer's willingness-to-pay curve $\widehat{p}(s^*)$ and the firm's willingness-to-sell curve $\widehat{s}^*(p)$. We will also return to this figure later.

[33] Suppose instead that the customer expected the agent to always make the same recommendation, regardless of the agent's compensation and the product price set by the firm. If in this case the customer's unconditional utility, $\widehat{p}(0) = qu_h + (1-q)u_l$, is not strictly positive, there will be no trade. Even if $\widehat{p}(0) > 0$ holds, however, there will only be trade if for $p = \widehat{p}(0)$ the firm's profits are non-negative as $\widehat{p}(0) - qk_h - (1-k_l)(q+\rho) \geq c_S/\mu$. (We use here that $w = 0$.)

Proposition 3 *The standard s^* implemented in equilibrium is increasing in the expected penalty ρ, decreasing in the sales incentives Δ, increasing in the effectiveness of monitoring ψ, and decreasing in the fraction η of the expected penalty that represents compensation to the customer.*

A change in Δ or ψ only shifts the firm's best-response function, $\widehat{s}^*$, but does not affect the customer's willingness to pay, $\widehat{p}$. The comparative analysis in Proposition 3 thus follows intuitively from Lemma 1, where we still kept the price constant. Likewise, as a change in η directly affects only $\widehat{p}$ but not $\widehat{s}^*$, the comparative statics result for the equilibrium standard follows immediately from combining Lemmas 1 and 2: because compensation accounts for a larger fraction of the firm's penalty, the firm can charge a higher price (Lemma 2), resulting in a lower standard (Lemma 1).

The comparative analysis in ρ is slightly more involved because there are two conflicting forces at work when $\eta > 0$. In the simplest case when no compensation is paid to the customer, $\eta = 0$, an increase in ρ only shifts $\widehat{s}^*$ upwards leaving $\widehat{p}$ unaffected. It follows immediately that the suitability standard increases. When a strictly positive fraction $\eta > 0$ of the penalty represents compensation to the customer, there is an additional indirect effect which works in the opposite direction: by increasing the maximum price that the firm can charge (Lemma 2), an increase in η tempts the firm to lower its standard (Lemma 1). We find that this second effect is always smaller than the direct effect, so that an increase in ρ always increases the equilibrium standard s^*. This also holds, in particular, if the entire penalty represents compensation to the customer ($\eta = 1$).

To see why this is the case, note first that the firm's choice of standard depends on how often the firm expects to pay the penalty at the *marginal* signal $s = s^*$, according to the first-order condition in (6). In contrast, the customer's willingness to pay in (7) depends on the *expected* compensation across all signals $s \geq s^*$. The first effect therefore is stronger as the chance the penalty (and thus the compensation to the customer) must be paid, $1 - q(s)$, is strictly decreasing in s.[34]

Irrespective of what fraction of ρ represents compensation to customers, a higher expected penalty has a disciplining role on the firm. This suggests using ρ as a policy instrument to induce a particular suitability standard. We address this issue in the fol-

[34] Clearly, the discrepancy between the two effects becomes more pronounced as a smaller fraction η of ρ is rebated to type–l customers.

lowing section. In turn, more effective monitoring (higher ψ) allows the firm to discipline its own agent more effectively, thereby leading to a higher standard. In contrast, higher prospecting costs result in a lower standard. These costs, Δ, may be higher for newly introduced products or for new entrants to a market.[35]

Finally, note that the comparative statics in Proposition 3 assumed that an equilibrium with $s^* > 0$ exists. When such an equilibrium exists, it is indeed unique. Otherwise, whether there is trade in equilibrium— albeit indiscriminately for all signals—depends on the customer's *unconditional* willingness to pay, $\widehat{p}(0) = qu_h + (1-q)u_l$ (cf. footnote 33).[36]

5 Agency and Policy

5.1 Role of Agency

Suppose that, in contrast to our present assumptions, the tasks of prospecting and advising are carried out by an entrepreneurial (owner-managed) firm. Absent the agency problem, the firm would advise the customer to purchase if and only if $\pi(s^*) \geq 0$. As the optimal choice of s^* under the agency problem must satisfy the requirement that $d\Pi_G/ds^* = dw/ds^*$, where $dw/ds^* > 0$, it follows immediately that a strictly higher standard s^* will result without the agency problem. The introduction of the agency problem thus affects the level of the equilibrium standard: because the agency problem increases the firm's *marginal* cost from raising the standard s^*, the equilibrium standard is lower than what results with an entrepreneurial firm.

In addition, the standard s^* becomes dependent on some parameters of the model only in the presence of the agency problem. This dependence clearly holds for all factors that determine the severity of the agency problem, as captured by the effectiveness ψ of

[35] Section 7 further discusses the role of product and industry characteristics. Section 9 develops an extension of the basic model that allows us to rephrase the comparative analysis in Δ in terms of the competitiveness of the market.

[36] There is an additional technicality from which we abstracted when discussing Proposition 3. Recall from the discussion of Proposition 1 (and, in particular, footnote 28) that for $\psi < 1$ the firm's profits are discontinuous at $s^* = 0$ (with w dropping to zero). For $\psi < 1$ the firm's best response has thus a discontinuity when extended to the corner $s^* = 0$: there is a threshold p' such that $\widehat{s}^*(p) > 0$ for $p < p'$ and $\widehat{s}^*(p) = 0$ for $p > p'$. In this case, an equilibrium with trade may have the firm randomizing between implementing $s^* = 0$ and $s^* = \widehat{s}^*(p')$. If instead $\psi = 1$ holds, for trade to arise in equilibrium, as presumed in Proposition 3, the following conditions are sufficient: First, with $-f(0)\mu\pi(0) > \Delta q'(0)/q$, where $p = \widehat{p}(0)$ and $q'(0) = dq(s^*)/ds^*|_{s^*=0}$, the firm would want to deviate to some $s^* > 0$ if the customer expected it to choose $s^* = 0$. Second, at the resulting (fixed point) value s^* the firm earns non-negative profits, for which it is in turn sufficient that $\widehat{p}(0) - qk_h - (1-q)(k_l + \rho) \geq c_S/\mu$.

the firm's monitoring technology. In addition, through the interdependence of the agent's tasks, s^* becomes dependent on the sales incentives the firm must offer the agent. In contrast, if the entrepreneur could sell directly without hiring an agent, then the equilibrium standard would not depend on either the costs of sales effort, c_S, or the likelihood with which effort results in a new customer contact, μ. While these costs are already sunk for the entrepreneur when advising the customer, the agent must still earn the sales commission b and, therefore, has a bias towards advising customers to purchase. This bias increases as the agent must be given higher incentives, following an increase in Δ.

5.2 Scope for Policy

We previously noted that the expected penalty ρ can be interpreted as a public policy parameter. However, firms may have incentives to discipline themselves, e.g., through the creation of a self-regulatory organization. This is most obvious in the case where otherwise $\rho = 0$. If in addition the customer's unconditional expected utility without advice was negative as $qu_h + (1-q)u_l < 0$, and if the firm had the same cost $k_\theta = k$ of serving either type of customer, then the market would break down. (More precisely, in this case no standard $s^* > 0$ for which $\widehat{p}(s^*) > k$ can be sustained as an equilibrium when $\rho = 0$.)

To analyze the minimum scope for policy intervention, we assume that the firm has the same means as a policymaker to impose a penalty $\rho > 0$ on itself in case u_l is realized.[37] Recall that the fraction $0 \leq \eta \leq 1$ of ρ represents a compensatory transfer to the customer, while the residual fraction $1-\eta$ represents the deadweight loss from enforcing the penalty.[38] Next define the firm's expected cost of serving a given customer by $k(s) = qk_h + (1-q)k_l$. From $u_l < 0$, it must hold that $u_h - k_h > u_l - k_l$; otherwise, any trade would be inefficient. Consequently, trade increases social welfare if and only if the observed s is sufficiently high. A social planner thus chooses ρ so as to maximize welfare

$$\mu \int_{s^*}^{1} \left[u(s) - k(s) - [1-q(s)](1-\eta)\rho\right] f(s)\, ds - c_S, \tag{8}$$

[37] Realistically, self-regulatory organizations might have less power and fewer means to enforce standards and discipline members than regulators. In addition, one could think about the issuance of warranties or, in the case of long-term contracts, about granting customers the right to early cancellation.

[38] If also η was a choice variable, then setting $\eta = 1$ would be optimal for both the firm and a social planner. Note that with $\eta = 1$ the firm essentially achieves (third-degree) price discrimination between type-h and type-l customers, where the former pay the price of p and the latter only the expected price of $p - \rho$.

subject to the constraint that the standard s^* resulting for any given ρ arises as the equilibrium of the ensuing market game. Note that when $\eta = 1$ welfare is clearly highest if the penalty is chosen such that $u(s^*) = k(s^*)$: the customer's expected utility at s^* is equal to the firm's expected cost of serving this customer.[39] If there is some deadweight loss from enforcing a penalty ($\eta < 1$), then $u(s^*) < k(s^*)$ holds at the social planner's optimal choice of ρ.

In what follows, it is again convenient to presume that the program of a social planner and that of a self-regulating firm are strictly quasi-concave. Also, to be concise we focus on the case where the suitability standard that is implemented by the respective optimal choice of ρ is always interior with $s^* > 0$.[40] Note that this implies, in particular, that $k_l + \rho > k_h$. Otherwise, as already noted earlier, firm and customer interests would be orthogonal, implying that the customer would never follow the firm's (or its agent's) advice.[41]

As the firm extracts all expected customer surplus (conditional on s^*) in (7), total surplus (8) is equal to the expected profits obtained by an entrepreneurial firm, $\Pi_G - c_S$. Consequently, the optimal choice of ρ by a social planner coincides with the choice of an entrepreneurial firm through the use of a self-regulatory organization.

However, this conclusion no longer holds for a firm selling through an agent. A firm subject to the agency problem would choose a strictly lower value of ρ, and accordingly s^*, than a social planner, because the agent's rent merely represents a transfer from the perspective of a social planner. This can be seen most directly when there is no deadweight loss, $\eta = 1$. In the absence of policy intervention, the firm through self-regulation would choose a level of ρ that leads to a standard s^* satisfying

$$-\mu f(s^*)\left[u(s^*) - k(s^*)\right] = \frac{dw}{ds^*} > 0$$

and thus $u(s^*) < k(s^*)$. In conclusion, the self-regulatory standard for a firm subject to the agency problem is strictly lower than the one resulting with a self-regulating entrepreneurial firm as well as with policy intervention.

[39] Note that from $u(0) = u_l < 0$ and from $u(1) = u_h > k_h$ the efficient threshold s^* is thus always interior.

[40] A sufficient condition for this is that η is not too small.

[41] For $k_l < k_h$ this requires that the optimal ρ that implements $s^* > 0$ must be bounded away from zero.

Proposition 4 *Suppose that through self-regulation a firm could avail itself of the same technology for choosing the level of the expected penalty ρ as a social planner. Then an entrepreneurial firm would choose the same ρ, and thus the same standard s^*, as a social planner, while a firm employing an agent would choose a strictly lower ρ, and thus also a strictly lower s^*, than a social planner.*

Finally, note that in order to maintain a given standard, a policymaker must increase ρ when the firm provides its agents with higher sales incentives (higher Δ) or when the effectiveness of the firm's internal monitoring decreases (lower ψ).[42]

6 Transparency of Commissions

In the preceding analysis, the standard $s^* = \widehat{s}^*(p)$ and the prevailing price $p = \widehat{p}(s^*)$ were jointly determined in equilibrium, given that the agent's compensation and thus the prevailing standard s^* were not observable to customers. Suppose instead that the firm can credibly disclose the compensation scheme (w, b). Because the compensation uniquely pins down a corresponding standard s^* from (1), the firm is able to choose any s^* along with the optimal price $\widehat{p}(s^*)$. The prevailing equilibrium standard s^* is characterized by the first-order condition

$$\mu \frac{d\widehat{p}(s^*)}{ds^*} [1 - F(s^*)] - f(s^*)\mu\pi(s^*) = \frac{dw}{ds^*}. \tag{9}$$

Comparing this with the first-order condition under no transparency, (6), the first term in (9) is new and captures the positive impact of a now *observable* increase in s^* on the maximum feasible price. From this observation (together with strict quasi-concavity of the objective function) we obtain the following result:

Proposition 5 *If the firm's compensation scheme can credibly be made transparent, a higher standard s^* results for any given ρ.*

In Figure 1, the equilibrium with transparency is obtained at the tangency of the firm's isoprofit curve, Π^T, with the customer's willingness-to-pay curve, $\widehat{p}(s^*)$. Profits are strictly

[42] Cf. Proposition 3. Holding the targeted standard fixed is indeed optimal if $\eta = 1$. For $\eta < 1$ it must also be taken into account that the social costs from implementing a given standard increase in Δ and decrease in ψ. Whether a social planner would want to increase ρ then depends on whether the additional deadweight loss is outweighed by the additional inefficiency that would result from a lower standard (holding ρ fixed).

higher than those realized without transparency, Π^N. Given the resulting higher price p with transparency, however, if the firm's commitment is not credible, then it would want to deviate to a lower standard $\widehat{s}^*(p)$, realizing still higher (off-equilibrium) profits Π^D.[43]

Under transparency, the fully observable compensation contract offered to the agent therefore provides the firm with a commitment device that is absent for entrepreneurial firms. Even though a firm would strictly prefer to voluntarily make its compensation transparent, in practice this may not be credible. Individual customers may lack incentives or legal means of monitoring the firm's remuneration policy. Furthermore, the firm may find ways to provide the agent with less observable (implicit) incentives to sell. Policy intervention could, instead, provide more credibility to disclosure.[44]

7 Organization of Sales Process

Direct marketing may be necessary to make customers aware of the existence of a new product or of a firm's entry into a market. Incumbents that sell more established products may not have to employ an agent who performs both tasks of prospecting and advising customers, though. For instance, a brick-and-mortar bank could inform its clientele about the availability of new savings or loan products during regular branch visits. This section explores how the organization of the sales process affects the prevailing suitability standard.

To this end, we generalize our analysis and assume that the task of advising is also costly: the agent can observe the pre-sale signal s at private disutility $c_A \geq 0$. As this may typically involve spending time with the customer so as to establish whether the respective product is a good match, we suppose that the customer (but not the firm) can observe whether the agent exerts effort at this stage. Recall that in equilibrium the firm sets the price equal to the customer's willingness to pay, $\widehat{p}(s^*)$. For $s^* > 0$ this strictly exceeds the customer's unconditional willingness to pay, $\widehat{p}(0) = qu_h + (1-q)u_l$. Consequently, if the agent shirks at the advice stage, then the customer will not purchase and the agent will earn only the base salary, w. For an agent who is incentivized to prospect for a customer, it must subsequently be optimal to exert effort at the advice stage. However, because the

[43] Note that as $\widehat{s}^*(p)$ maximizes profits for given p, iso-profit curves have zero slope at the point where they intersect with $\widehat{s}^*(p)$.

[44] Under the "Markets in Financial Instruments Directive" (MiFID) since January 2008 commissions for the sale of retail financial products must be disclosed in the European Union. In the U.K., such a requirement has been mandated by the Financial Service Authority for several years.

agent has to be compensated for the associated costs of information acquisition, c_A, this requires a higher commission. To prevent a reduction in standard, the higher commission must be matched by a higher base salary.

Taking the agent's additional costs c_A into account, the agent complies with some standard s^* if the base wage equals

$$w = \frac{(c_S/\mu + c_A)\left[1 - \psi\left[1 - q(s^*)\right]\right]}{\psi \int_{s^*}^{1} \left[q(s) - q(s^*)\right] f(s) ds}, \tag{10}$$

analogously to the derivation in Proposition 1. This implies that the marginal cost of raising the standard, dw/ds^*, is higher if $c_A > 0$. Applying the results from Proposition 3, we have the following:

Proposition 6 *If the agent has to incur an additional private cost c_A to observe the signal s, then the firm must pay a higher sales commission and a higher base salary to ensure compliance with a given standard.*

Suppose instead that the agent only provides advice, but does not control the customer's arrival (with probability μ). The agent's cost for making a sale is equal to the cost of information acquisition, c_A. Completely analogous to our previous results, the required salary is

$$w = \frac{c_A\left[1 - \psi\left[1 - q(s^*)\right]\right]}{\psi \int_{s^*}^{1} \left[q(s) - q(s^*)\right] f(s) ds}. \tag{11}$$

Comparing with (10), we have the following:

Proposition 7 *Compared to the baseline case in which the same agent who prospects for customers also advises them, a strictly higher equilibrium standard s^* results when one agent is responsible only for prospecting and a second agent is separately in charge of advising.*

This result provides a causal link between the organization of the sales process in an industry or firm and the prevailing suitability standard.[45] If firms in an industry differ in how they organize their sales process, then Proposition 7 suggests that a uniform policy may be too harsh on some but too lenient on other firms.

[45] While there are clearly circumstances in which task separation is not feasible, some firms may have the choice between allocating tasks separately or to a single agent (and, thereby, possibly also enjoying additional cost synergies $\delta > 0$). For example, door-to-door direct marketing techniques may be more cost effective for selling new products. Absent any necessity to bundle tasks or strong cost synergies from doing so, it is straightforward to show that task separation would be optimal.

8 Contract Resale

For the purpose of this section, it is helpful to focus on the case of financial products, particularly loan contracts. Banks and other intermediaries that originate loans, in particular mortgages to households, often resell them to free up capital and diversify risk. We presume that this does not shield the originating firm from the penalty ρ.[46] However, when $k_l \neq k_h$, reselling a contract at price P still affects the firm's relative profits from selling to different types of customers. If a loan is not resold, then the firm's profits (gross of the penalty) are given by $p - k_\theta$, while the firm realizes P if the contract is resold.

We now stipulate that $k_l > k_h$, which for given prices makes type-l customers less attractive to the firm, provided it does not resell contracts.[47] Now denote by $\widehat{\pi}(s) := P - [1 - q(s)]\rho$ the firm's expected profits when reselling a contract. We suppose that P is set along with p at the start of the game, i.e., before the firm implements s^* through the choice of its compensation scheme. The resale price is optimally chosen as high as possible given the anticipated standard s^*, now extracting all surplus from the buyers of the contracts:

$$\widehat{P}(s^*) := \int_{s^*}^{1} [p - k(s)] \frac{f(s)}{1 - F(s^*)} ds. \tag{12}$$

We consider a firm that keeps a fraction τ of its contracts, and sells the remaining fraction $1 - \tau$.[48]

Proposition 8 *If $k_l > k_h$ holds strictly, then the equilibrium standard decreases as the firm resells a larger fraction of its contracts. In this case, the agent's compensation is made steeper (higher b/w ratio).*

In the U.S. mortgage market, banks and financial firms are the two main types of mortgage originators. According to Bernadette Minton, Anthony B. Sanders, and Philip

[46] Following the recent increase of defaults in subprime loans and the associated claims of misselling, some U.S. politicians recently have proposed a system of "assignee liability" to extend legal and financial liability to investment banks that repackage mortgages into bonds and sell them (see 'Democrats hit out at Wall St. over subprime loans,' *Financial Times*, April 12, 2007). In the context of our model, it is easy to show that a strictly lower standard results when the originating firm only bears a fraction λ of ρ while the residual fraction $1 - \lambda$ is "assigned" to the ultimate counterparty of the customer, i.e., the buyers of the (loan) contracts. On the other hand, a strictly higher standard arises if an additional penalty $\widehat{\rho} > 0$ is imposed.

[47] Applied to household loans, type-l customers may have more risky future income. They may also benefit less from a loan in the presence of substantial personal bankruptcy costs. In this case, the role of advice could be justified by the complexity of products but also by the low sophistication of some households, who may be far less able to predict their likelihood of default than the firm and its agents.

[48] Note that as the firm does not observe s, it cannot opportunistically resell only contracts with low s.

E. Strahan (2004), banks are more likely to retain the loans they originate, while financial firms are more likely to sell their loans on the secondary market. Consistent with this, casual evidence suggests that bank loan officers are more likely to earn a fixed salary while loan officers in financial firms earn substantial commissions. Proposition 8 also suggests that banks would apply a higher standard s^*.[49]

In terms of public policy, the heterogeneity of firms' proclivity to resell contracts, like the heterogeneity in internal sales processes, creates a problem: a uniformly targeted standard cannot be obtained by implementing a uniform policy, as represented by ρ.

9 Elastic Demand and Competition

Thus far the equilibrium price has been determined by the customer's expected net utility given the prevailing standard s^*. This section generalizes the model by considering a non-trivial pricing problem with elastic demand. Now suppose that for given price p and expected standard s^* the likelihood with which an interested customer arrives is given more generally by a strictly decreasing function $\mu(z^*)$, where $z^* = p - E[u \mid s \geq s^*]$ with $E[u \mid s \geq s^*] := \int_{s^*}^1 u(s) \frac{f(s)}{1-F(s^*)} ds$. Hence, $\mu(z^*)$ represents the firm's residual demand function, expressed by the probability of a given customer being willing to purchase when advised to do so.

Consider first an entrepreneurial firm, with gross profits $\Pi_G = \mu(z^*) \int_{s^*}^1 \pi(s) f(s) ds$. Focusing on an interior optimum, profits are maximized by a price p satisfying the first-order condition

$$\left[\int_{s^*}^1 \pi(s) \frac{f(s)}{1 - F(s^*)} ds\right] \left[1 - \frac{dE[u \mid s \geq s^*]}{ds^*} \frac{ds^*}{dp}\right] = -\frac{\mu(z^*)}{\mu'(z^*)}. \tag{13}$$

Recall also that the entrepreneurial firm advises the customer to purchase if and only if $\pi(s) \geq 0$, by setting $\pi(s^*) = 0$. If we had $ds^*/dp = 0$, we would be back to a standard pricing problem with the firm's (expected) margin from a sale being on the left-hand side of (13).[50] In our model of advice, however, an increase in p also shifts the standard s^* downwards, because $ds^*/dp = -1/\pi'(s^*) < 0$. As this reduction in standard is rationally expected by the customer, a further reduction in demand is induced because the customer's expected utility from a purchase, $E[u \mid s \geq s^*]$, is strictly increasing in s^*.

[49] On a possible link between the suitability standard and the sale of loans in the case of subprime mortgages, see the recent evidence in Atif R. Mian and Amir Sufi (2008).

[50] Dividing the right-hand side by p, we would obtain the elasticity of the firm's residual demand.

What is the effect of a change in the firm's competitive environment? For given price p, an increase in competition should lead first and foremost to a reduction in the firm's residual demand, $\mu(z^*)$. For an entrepreneurial firm, this does not directly affect the prevailing standard s^* because $\pi(s^*) = 0$ is independent of demand. However, a change in residual demand affects s^* indirectly, through a possible change in price p. If the firm responds to the increase in competitive pressure by lowering p, a sale becomes less attractive, leading to an increase in s^*.

This observation for the entrepreneurial firm mirrors a finding by Bolton, Freixas, and Shapiro (2007). In their model, only one of two firms provides a product that offers the best match for a given, uninformed customer. Under competition, the firm whose product is *ex ante* less likely to provide the best fit chooses a low price to commit to giving appropriate advice.[51] Thus, competition would be associated with lower prices and reduced incentives to missell. In contrast, a firm selling through an agent may lower its suitability standard as competitive pressure increases, as we show below.

In the presence of the agency problem, a reduction in residual demand has a *direct* effect on the prevailing standard. To see this most clearly, we proceed by holding the price p fixed. There are now two reasons why a reduction in $\mu(z^*)$ pushes down the optimal standard with the agency problem. To make transparent the two effects by which a reduction in $\mu(z^*)$ affects s^*, restate the first-order condition (6) as follows:

$$-\mu(z^*)f(s^*)\pi(s^*) = \frac{dw}{ds^*}. \tag{14}$$

The first effect works through an increase in the marginal costs of raising the standard, dw/ds^*. From Proposition 1 we have with $\Delta = c_S/\mu$ that

$$\frac{dw^2}{ds^* d\mu} = -\frac{1}{\mu}\frac{dw}{ds^*} < 0.$$

The second effect works through the first term in the derivative (14). Recall here that $\pi(s^*) < 0$ holds at the optimal choice $s^* = \widehat{s}^*$, implying that a sale at $s = s^*$ is *ex post* unprofitable for the firm. (Intuitively, this was optimal because from $dw/ds^* > 0$ a reduction in the standard allows the firm to reduce the *ex ante* agency costs.) A reduction

[51] As in our setting, the firm trades off profits from selling with post-sale costs incurred if the customer was ill served by the purchase. Unlike us, they posit that the customer always has a positive willingness to pay for either of the two firms' products, while firms observe perfectly which product provides the best fit.

in $\mu(z^*)$ now makes a sale less likely from an *ex ante* perspective. Consequently, the firm's objective function puts less weight on the *ex post* loss $\pi(s^*) < 0$ relative to the *ex ante* benefits in terms of lower agency costs. Formally, this is expressed by the factor $\mu(z^*)$ in the first term of the derivative (14).

In equilibrium, for a given p the customer again must have rational expectations about the prevailing standard. Recall that customer expectations affect residual demand through the "net price" $z^* = p - E[u \mid s \geq s^*]$. Since the net price z^* is now strictly decreasing in s^* and the optimal standard is also strictly decreasing in z^*, there may now be multiple equilibria, in stark contrast to the cases analyzed thus far.[52] Intuitively, if customers expect the firm to apply a higher standard, then they become more willing to purchase. As this in turn lowers z^*, and thereby pushes up the probability of a sale, it indeed becomes optimal for the firm to implement a higher standard through the choice of its compensation scheme. If, instead, customers anticipate a lower standard, then the higher cutoff z^* and the corresponding lower probability of a sale make it optimal for the firm to set the lower standard.

To formalize the preceding discussion, we now stipulate for concreteness a functional form for the level change in residual demand $\mu(z^*) = \widehat{\mu}(\alpha + z^*)$, where an increase in the demand shifter α represents a reduction in demand everywhere.[53]

Proposition 9 *Holding the price p constant, if there is a unique equilibrium, then the equilibrium standard s^* strictly decreases in the level of the firm's residual demand, as captured by an increase of α in $\widehat{\mu}(\alpha + z^*)$.*

If the firm optimally reacts to a decrease in demand by reducing its price, with agency there are two countervailing effects on the suitability standard. The overall effect intuitively depends on specific circumstances in the following way. If competition intensifies among the same players, the price effect may be more important, with firms ending up with market

[52] For an entrepreneurial firm with elastic demand, in contrast, uniqueness for a given p is trivially guaranteed because s^* does not depend on z^*.

[53] Proposition 9 would hold also if we stipulated instead that $\mu(z^*) = \alpha\widehat{\mu}(z^*)$ or that $\mu(z^*) = \widehat{\mu}(z^*) - \alpha$. The specification $\mu(z^*) = \widehat{\mu}(\alpha + z^*)$ allows for the following natural interpretation. A given customer's net utility could depend, first, on a random component $z \in [\underline{z}, \overline{z}]$ with cumulative distribution $G(z)$, capturing horizontal differentiation, and, second, on the value of the next best alternative, which could be captured by α: $z^* := p + \alpha - E[u \mid s \geq s^*]$. Note that if $u_l - \alpha + \overline{z} < 0$ holds, then a sale to a type-l customer would still be always inefficient. Finally, note that if z is uniformly distributed, it is straightforward to show that the entrepreneurial firm's program for p is strictly quasi-concave, while from implicit differentiation of (13) an increase in α leads to a strictly higher optimal price p.

shares similar to their initial level. If, instead, entry of new competitors significantly reduces a firm's share of the market, then the effect of Proposition 9 should be more pronounced. For instance, if entrants were to target a particular customer segment, which the firm could only retain by a substantial reduction in price, then the firm's best response actually may be to sustain its price while accepting a lower market share. This would then lead to a reduction in the standard s^*.

10 Conclusion

A firm that sells through agents must ensure that they comply with its internal standards when advising customers. When the sales force requires steeper incentives (for example, as competition for customers intensifies), ensuring compliance with a given standard becomes more costly for the firm. Faced with a higher marginal cost of compliance, the firm gradually becomes more permissive towards potential misselling.

Introduction of the internal agency problem has two key implications. First, it affects the level of the suitability standard prevailing in equilibrium. Second, it is only through the agency problem that standards are affected by several additional factors, such as the difficulty in attracting customers, the transparency of the commission structure, and the organization of the sales process. When addressing misselling problems, policymakers must take into account these organizational variables, unless the industry is exclusively composed of entrepreneurial professionals.

The consideration of firms' agency problems also points to a potential pitfall for policymakers. To the extent that firms vary in their respective characteristics (such as the organization of their sales process), different policy standards would be required for different firms within the same industry, which may not always be feasible to implement.

Future work could adapt our framework to the circumstances of particular industries. Such analysis could shed light on cross-country differences in regulation and industry organization. While the prevailing policy may affect firms' contractual and organizational choices, the prevailing organization of the industry (including the degree of competition, the level of vertical integration, or the use of independent intermediaries) in turn should influence the optimal policy response.

Appendix A: Conflicting Tasks in Direct Marketing Agency

This appendix analyzes incentive provision for a direct marketing agent in the context of a toy version of our model. In this streamlined model, we assume that the agent perfectly observes the customer's type and is granted full control over the purchase decision.[54] To illustrate the conflict between the agent's two tasks in the simplest way, we further suppose that the firm wants to induce the agent to exert prospecting effort and to sell only to the type-h customer.

Because the agent is protected by limited liability and the outside option for the agent is set to zero, it is optimal for the firm to pay no wage, $w_0 = 0$, when the post-sale signal indicates a type-l customer. That leaves two compensation levels to be determined for the two remaining verifiable states: a wage of w_2 if no such negative information is received following a sale, and a wage of w_1 if no sale is made. Because the agent's expected payoff from a sale to a type-l customer is $(1-\psi)w_2$, the condition

$$w_1 \geq (1-\psi)w_2 \tag{15}$$

ensures that the agent does not sell to a type-l customer.[55] To guarantee that the agent does not sell indiscriminately to all customers, the wage w_1 must be large enough to compensate the agent for the payoff foregone when not recommending a purchase. Intuitively, condition (15) is easier to satisfy if a deviation (i.e., misselling to a type-l customer) is detected with a higher probability ψ.

In addition, the compensation scheme must incentivize the agent to incur search cost c_S to contact a customer in the first place. Recall here that sale follows search effort only with probability μq, given that a potential customer is located with probability μ and that the fraction of type-h customers is q. Because the agent receives w_1 when not concluding a sale, the agent will only exert effort if

$$\mu q(w_2 - w_1) \geq c_S. \tag{16}$$

That is, the commission $w_2 - w_1$ the agent realizes when making a sale to a type–h customer must be sufficiently large. Condition (16) is easier to satisfy if it is more likely overall that a sale is made after incurring cost c_S.

[54] While we assume here that the customer delegates the purchase decision to the agent, in equilibrium of our baseline model it is optimal for the customer to follow the agent's non-binding advice.

[55] As is immediately apparent, the agent under the optimal contract will strictly prefer to sell to type-h customers.

The firm's objective is to minimize expected wage costs $\mu q w_2 + (1 - \mu q) w_1$ subject to the constraints (15) and (16). We now verify that both constraints (15) and (16) must bind for the expected wage bill to be minimized. If neither of these two constraints was binding, then the firm could deviate profitably by marginally reducing either of the two wages w_1 or w_2. Suppose now that (15) was not binding, in which case we already know that (16) must bind. After substitution, the firm's expected wage costs then become $c_S + w_1$. As long as (15) was not binding, the firm could then profitably deviate by further reducing w_1. Having thus established that (15) must always bind, we now can substitute this constraint to obtain the expected wage costs $w_2[1 - \psi + \psi\mu q]$. Unless (16) also binds, the firm thus could profitably deviate by further reducing w_2. From the two binding constraints (15) and (16), we find the rent the agent obtains, even when not exerting sales effort. This rent,

$$w_1 = c_S \left(\frac{1-\psi}{\psi} \frac{1}{\mu q} \right),$$

originates from the firm's inability to distinguish whether a lack of a sale should be attributed to the agent's failure to prospect for a customer or to the presence of an unsuitable customer.[56]

The agent's rent—borne by the firm to prevent (mis)selling to a type-l customer—is strictly increasing in the agent's cost of sales effort, c_S. This comparative statics result is driven by the interdependence between the agent's two tasks. To understand this, denote the agent's base salary (paid when no sale is made) by $w := w_1$ and the sales commission (paid, in addition to the base salary, following a sale that is not subsequently contested) by $b := w_2 - w_1$. Rewriting the binding constraint (16) for eliciting sales effort from the agent as

$$b = \frac{1}{q} \frac{c_S}{\mu},$$

we see that a higher commission is necessary after an increase in c_S or a decrease in $q\mu$. In either case, generating a suitable sales opportunity is more costly for the agent, implying that incentives must increase. But the greater the incentives to sell, the more the agent is tempted to subsequently missell to a type-l customer. Transforming the binding constraint

[56] In contrast, if it was verifiable whether the agent contacted a customer, then the firm could directly compensate the agent for the associated effort cost c_S, thereby ensuring that the agent would not be biased towards recommending purchase. Also, paying the agent a rent would no longer be necessary if the customer type was verifiable (without noise). In that case, the firm could simply specify $w_l = 0$ for a sale to a type-l customer and $w_h = c_S/(q\mu)$ for a sale to a type-h customer.

(15) for eliciting only suitable sales into the requirement

$$w = b\left(\frac{1-\psi}{\psi}\right),$$

we see that, when the sales commission b is higher, the firm must increase the base salary w to rebalance the incentives for the agent not to sell at all. Hence, when the task of locating potential customers and generating interest in the product becomes more difficult, the firm must increase not only the commission but also the salary to ensure that the agent sells only to suitable customers. Intuitively, the extent to which the firm must pay the agent a rent through the base salary is also determined by ψ, the effectiveness of the firm's ability to monitor the agent.

Appendix B: Proofs

Proof of Proposition 1: For this proof, we introduce the following notation for the payments made to the agent: w_1 if no sale was made, w_2 if a sale was made and no negative information was obtained, and w_0 if a sale to a type-l customer was detected. It remains to be shown that it is optimal for the firm to set $w_0 = 0$. In general, the agent's expected compensation from a sale is given by $V(s) = w_0 + [1 - [1 - q(s)]\psi](w_2 - w_0)$. By optimality, incentive constraint (2) binds, from which it follows that the agent extracts rent $w_1 = V(s^*)$, given standard s^*. The firm's objective is thus to choose (w_0, w_1, w_2) so as to minimize $V(s^*)$ while still satisfying (2). After substitution from the definition of $V(s)$ and (2), we obtain

$$w = V(s^*) = w_0 + \frac{c_S}{\mu}\frac{1-\psi[1-q(s^*)]}{\int_{s^*}^{1}[q(s)-q(s^*)]\,f(s)ds},$$

from which $w_0 = 0$ is indeed optimal.

Proof of Proposition 2: Differentiating (4), we obtain $dw/d\Delta = w/\Delta > 0$ along with

$$\begin{aligned}\frac{dw}{d\psi} &= -\frac{1}{\psi^2\int_{s^*}^{1}[q(s)-q(s^*)]\,f(s)ds} < 0,\\ \frac{dw}{ds^*} &= \frac{\Delta\int_{s^*}^{1}[1-\psi\,[1-q(s)]]\,f(s)ds}{\psi\left[\int_{s^*}^{1}[q(s)-q(s^*)]\,f(s)ds\right]^2}\frac{dq(s^*)}{ds^*} > 0.\end{aligned}$$

Further differentiation yields

$$\begin{aligned}
\frac{d^2w}{ds^*d\Delta} &= \frac{\int_{s^*}^1 \left[1-\psi\left[1-q(s)\right]\right] f(s)ds}{\psi\left[\int_{s^*}^1 \left[q(s)-q(s^*)\right] f(s)ds\right]^2}\frac{dq(s^*)}{ds^*} > 0, \\
\frac{d^2w}{ds^*d\psi} &= -\frac{\Delta\left[1-F(s^*)\right]}{\psi^2\left[\int_{s^*}^1 \left[q(s)-q(s^*)\right] f(s)ds\right]^2}\frac{dq(s^*)}{ds^*} < 0.
\end{aligned}$$

Proof of Proposition 3: Using the fact that $\widehat{s}^*$ is strictly decreasing in p and that $\widehat{p}$ is strictly increasing in s^*, when the system $s^* = \widehat{s}^*(p)$ and $p = \widehat{p}(s^*)$ has a (fixed point) solution $s^* > 0$, this solution must be unique. For comparative statics, it is now convenient to rewrite the equilibrium conditions as

$$\begin{aligned}
\varsigma_1 &: = p - \int_{s^*}^1 u(s)\frac{f(s)}{1-F(s^*)}ds = 0, \\
\varsigma_2 &: = -f(s^*)\mu\pi(s^*) - \frac{dw}{ds^*} = 0.
\end{aligned}$$

The determinant of the Jacobian, $D = (\partial\varsigma_1/\partial s^*)(\partial\varsigma_2/\partial p) - (\partial\varsigma_2/\partial s^*)(\partial\varsigma_1/\partial p)$, is strictly positive from $\partial\varsigma_1/\partial s^* < 0$, $\partial\varsigma_1/\partial p > 0$, $\partial\varsigma_2/\partial s^* < 0$, and $\partial\varsigma_2/\partial p < 0$. From Cramer's rule, $ds^*/d\rho > 0$ holds if $(\partial\varsigma_1/\partial\rho)(\partial\varsigma_2/\partial p) < (\partial\varsigma_2/\partial\rho)(\partial\varsigma_1/\partial p)$. This condition is equivalent to

$$\eta < \frac{1-q(s^*)}{\int_{s^*}^1 \left[1-q(s)\right]\frac{f(s)}{1-F(s^*)}ds},$$

which is satisfied because $s^* < 1$. The comparative statics in Δ, ψ, and η are more immediate as each of these variables affect only one of the two conditions ς_1 and ς_2. Precisely, we have

$$\begin{aligned}
\frac{ds^*}{d\Delta} &= -\frac{1}{D}\left[\frac{d^2w}{ds^*d\Delta}\frac{\partial\varsigma_1}{\partial p}\right] < 0, \\
\frac{ds^*}{d\psi} &= -\frac{1}{D}\left[\frac{d^2w}{ds^*d\psi}\frac{\partial\varsigma_1}{\partial p}\right] > 0, \\
\frac{ds^*}{d\eta} &= -\frac{1}{D}\left[\left(-\rho\int_{s^*}^1 \left[1-q(s)\right]\frac{f(s)}{1-F(s^*)}ds\right)\frac{\partial\varsigma_2}{\partial p}\right] < 0,
\end{aligned}$$

where we use $d^2w/ds^*d\Delta > 0$ and $d^2w/ds^*d\psi < 0$ from Proposition 2.

Proof of Proposition 4: Restricting attention to cases in which the implemented choices of s^* are interior, it remains to show that a firm selling through an agent chooses a strictly smaller level of ρ and, from Proposition 3, a strictly lower level of s^* than the social planner. Recall that the objective function, $\Pi_G - c_S - w$, is assumed to be strictly quasiconcave in the choice variable ρ. The assertion then follows immediately from $dw/d\rho = (dw/ds^*)(ds^*/d\rho) > 0$, where $dw/ds^* > 0$ by Proposition 2 and $ds^*/d\rho > 0$ by Proposition 3.

Proof of Proposition 8: To solve for an equilibrium, it is convenient to define a value $\omega := \tau p + (1-\tau)P$ and a function $\widehat{\omega}(s^*) := \tau\widehat{p}(s^*) + (1-\tau)\widehat{P}(s^*)$, where

$$\widehat{\omega}(s^*) = \widehat{p}(s^*) - (1-\tau)\int_{s^*}^{1} [q(s)k_h + [1-q(s)]k_l] \frac{f(s)}{1-F(s^*)} ds. \tag{17}$$

Note that $\widehat{\omega}(s^*)$ is strictly increasing in s^* as $\widehat{p}(s^*)$ increases in $s^*$and $k_h < k_l$. Gross profits are now $\Pi_G = \mu \int_{s^*}^{1} [\tau\pi(s) + (1-\tau)\widehat{\pi}(s)] f(s)ds$, with first-order condition

$$\frac{d\Pi_G}{ds^*} = -f(s^*)\mu [\tau\pi(s^*) + (1-\tau)\widehat{\pi}(s^*)] = \frac{dw}{ds^*}.$$

With a slight abuse of notation, we now denote the optimal standard as a function $\widehat{s}^*(\omega)$, which is strictly decreasing. Equilibrium is given by the requirements $s^* = \widehat{s}^*(\omega)$ and $\omega = \widehat{\omega}(s^*)$. If an interior equilibrium with $s^* > 0$ exists, then uniqueness again follows from strict monotonicity: $\widehat{\omega}(s^*)$ is strictly increasing and $\widehat{s}^*(\omega)$ is strictly decreasing. Note that the partial derivatives satisfy $\widehat{\omega}_{s^*} > 0$, $\widehat{s}^*_{\omega} < 0$, $\widehat{s}^*_{\tau} > 0$, and $\widehat{\omega}_{\tau} > 0$.

For comparative statics of s^* in τ, it is now convenient to consider the system of equations $s^* = \widehat{s}^*(\omega)$ and $\omega = \widehat{\omega}(s^*)$. With the determinant of the Jacobian $D = 1 - \widehat{s}^*_{\omega}\widehat{\omega}_{s^*} > 0$, we have that $ds^*/d\tau = -D_\tau/D > 0$, where $D_\tau = -\widehat{\omega}_\tau - \widehat{s}^*_\tau\widehat{\omega}_{s^*} < 0$. Finally, comparative statics in the compensation scheme follows immediately from $ds^*/d\tau > 0$ and the characterization of b/w in (1).

Proof of Proposition 9: Analogously to the proof of Proposition 3, we characterize the equilibrium for a given price p as a solution to the following two equations in z^* and s^*:

$$\begin{aligned} \xi_1 &: = z^* - [\alpha + p - E[u \mid s \geq s^*]] = 0, \\ \xi_2 &: = -f(s^*)\mu(z^*)\pi(s^*) - \frac{dw}{ds^*} = 0. \end{aligned}$$

Note also that

$$\frac{\partial \xi_2}{\partial z^*} = -\mu'(z^*)f(s^*)\pi(s^*) - \frac{d^2w}{ds^*dz^*} < 0$$

follows from

$$\frac{d^2w}{ds^*dz^*} = -\frac{\mu'(z^*)}{\mu(z^*)}\frac{dw}{ds^*} > 0$$

and $\pi(s^*) < 0$. Uniqueness is ensured, as stipulated in the main text, because the determinant of the Jacobian of the system (ξ_1, ξ_2) is strictly positive. Therefore, $ds^*/d\alpha = (\partial\xi_2/\partial z^*)/D < 0$.

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