Deception under Competitive Intermediation

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Abstract

This paper investigates the incentives of intermediaries—such as mortgage brokers, financial advisors, or insurance salespeople—to educate consumers who misperceive the value of products. Two types of firms sell products through competing common-agent intermediaries and pay commissions for sales. One sells a transparent product, while the other sells a deceptive product that has a hidden fee, quality, or risk. Each intermediary chooses which product to offer and whether or not to educate consumers about the hidden attribute. Each consumer visits a fixed number of intermediaries and buys at most one item. When consumers correctly anticipate the hidden attribute, intermediaries reveal it and commissions are competed away. When consumers misperceive the hidden attribute, however, intermediaries employ deception if and only if the degree of misperception is large. If deception occurs, intermediaries earn high commissions despite competition. Furthermore, because consumers ultimately bear the cost of such commissions, consumer welfare is lower when intermediaries can educate consumers than when they cannot. Deception is less likely to occur when consumers visit more intermediaries before making their purchase decisions. Conditional on deception, however, visiting more intermediaries further raises the level of commissions because deceptive firms need to give each intermediary a higher commission to maintain the deception. Regulating commissions—analogous to recent policies in the US mortgage industry as well as in the Australian and UK mutual-fund industries—can lead intermediaries to reveal all hidden attributes.

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1 Introduction

In the mortgage, mutual fund, and insurance industries, products are often sold through independent intermediaries.\(^1\) A primary role of the intermediaries is to help consumers make better purchase decisions by informing them about product attributes. This educational role of intermediaries is particularly important for uninformed or confused consumers who may be inattentive to “hidden” fees, qualities, or risks.\(^2\) Nevertheless, recent empirical studies report that intermediaries often give advice that is detrimental to consumers but benefits product providers.\(^3\) Some of these studies find that intermediaries receive higher commissions from product providers for selling products which are worse for consumers.\(^4\) Yet, how intermediaries can profitably sell worse products and get higher commissions in a competitive environment remains largely unexplored.

Building on Gabaix and Laibson (2006) and complementing the literature on intermediation under consumer naivete (Stoughton, Wu and Zechner 2011; Bolton, Freixas and Shapiro 2012; Inderst and Ottaviani 2012c), this paper investigates the incentives of competing intermediaries to educate consumers who misperceive the value of products. I show that when intermediaries are motivated by commissions, deception (i.e., not educating consumers about their misperception) occurs if and only if the degree of misperception is large. In the deceptive equilibrium, each intermediary faces a trade-off between expanding market share by educating consumers and earning higher commissions per sale by exploiting consumers. Based on this trade-off, intermediaries engage in deception if deceptive firms can pay sufficiently high commissions—financed by deception—with which transparent firms cannot compete. If deception occurs, then intermediaries receive high

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\(^1\) In the US, the Investment Company Institute reports that among all households who hold mutual funds including pension plans, 53 percent of them own funds purchased through investment professionals, and 82 percent of households do so after excluding pension plans (Profile of Mutual Fund Shareholders, 2012). The Mortgage Bankers Association (MBA) reports that 50 percent of all mortgage loans and 71 percent of subprime loans are originated through mortgage brokers (Residential Mortgage Origination Channels, MBA Research Data Notes, 2006).

\(^2\) Anagol and Kim (2012) find that investors are less sensitive to mutual-fund fees when the fees are amortized and hidden. Gurun, Matvos and Seru (2013) report that consumers are less sensitive to post-introductory interest rates than to initial interest rates of adjustable-rate mortgages because of “deceptive advertisements” by mortgage lenders. See also the Federal Trade Commission’s article on deceptive mortgage advertisements: http://www.consumer.ftc.gov/articles/0087-deceptive-mortgage-ads.

\(^3\) Mullainathan, Nöth and Schoar (2010) conduct an audit study and find that most financial advisors cater to their customers’ biases, such as return chasing, and promote high-fee mutual funds. Anagol, Cole and Sarkar (2012) report that 60 percent or more of life-insurance salespeople recommend strictly-dominated insurance plans.

\(^4\) Chalmers and Reuter (2012) report that customers who consulted brokers for retirement plans allocate their money more to funds with higher broker fees, although on average these broker-recommended funds underperform a default investment option. Christoffersen, Evans and Musto (2013) find that in the US mutual-fund industry, a higher commission increases a fund flow while it also predicts future poorer fund performance.
commissions even when they are competing for consumers. Such deception severely harms social and consumer welfare. Consistent with the evidence described in the previous paragraph, intermediaries can profitably sell products with lower, or even negative, social surplus. Intermediaries are less likely to educate consumers when their educational role is more important. Further, consumer welfare is lower when intermediaries can—but do not—educate consumers than when they cannot educate consumers. Analogous to recent policies in the US mortgage industry as well as in the Australian and UK mutual-fund industries, regulating commissions can lead intermediaries to educate consumers and hence can increase consumer and social welfare.  

After summarizing the related theoretical literature in Section 2, I set up the model and discuss its key assumptions in Section 3. In the model, two firms sell their products to a unit mass of homogenous consumers. One firm produces a deceptive product that has a hidden product attribute such as an additional fee, a harmful quality, or a future risk, whereas the other firm produces a transparent product that has no hidden attribute. Firms can sell their products only through profit-maximizing common-agent intermediaries, to whom they pay sales commissions. Each intermediary decides which product to promote and whether to educate consumers about the hidden attribute of the deceptive product. Each consumer visits a fixed number of intermediaries and buys at most one item. Following Gabaix and Laibson (2006) and Heidhues, K˝ oszegi and Murooka (2012a), I assume that consumers are naive both in the sense that they are initially unaware of the hidden attribute and that they do not infer its existence from the level of prices or commissions. Consumers take hidden attributes into account when making their purchase decisions if and only if they are educated by some intermediary. I investigate subgame-perfect Nash equilibria played by firms and intermediaries. In particular, I focus on identifying conditions for equilibria in which intermediaries employ deception.

Section 4 analyzes the model and discusses welfare implications. To compare equilibrium outcomes across market structures, before the main analysis I investigate two benchmark cases. First, I show that if firms can directly educate consumers about hidden attributes, then the transparent firm always reveals the deceptive firm’s hidden attributes. Second, I show that if consumers are sophisticated in that they either know which products have hidden attributes or anticipate that

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5 In the US mortgage industry, “to protect mortgage borrowers from unfair, abusive, or deceptive lending practices,” the Federal Reserve Board has prohibited compensation to a mortgage broker based on terms or conditions of a mortgage transaction since 2011 (Banking and Consumer Regulatory Policy Press Release, August 16, 2011). Also, in the Australian and UK mutual-fund industries, commissions to financial advisors have been banned since 2013.
some products have hidden attributes, then a product with lower social surplus is never sold and commissions are driven down to a competitive level.

I then investigate the main model in which consumers are naive and firms sell their products through intermediaries. Holding the other parameters constant, I show that deception occurs if and only if the amount of the hidden attribute is large. Specifically, the condition for deception hinges on an intermediary’s trade-off between expanding market share and earning higher commissions per consumer. On the one hand, an intermediary can increase its market share by educating consumers and attracting them from other intermediaries. On the other hand, an intermediary can earn higher commissions by not educating consumers and selling the deceptive product. As a result, deception occurs if the deceptive firm can give sufficiently high commissions—financed by the hidden attribute—with which the transparent firm cannot compete. Because the deceptive firm needs to give a sufficiently high commission to each intermediary to maintain the deception, competition among intermediaries does not lower the level of commissions when deception occurs. Conditional on deception, increasing consumers’ search intensity (i.e., the number of intermediaries consumers visit) further raises the level of commissions. Nevertheless, deception becomes less likely to occur as the search intensity increases. Hence, consumers’ search intensity has a non-monotonic effect on the level of commissions.

When deception occurs, the educational role of intermediaries exhibits perverse welfare effects. Deception distorts consumer and social welfare; because consumers misperceive the value of products, intermediaries can profitably sell products with lower social surplus or even ones with negative social surplus. Intermediaries are less likely to educate consumers as their educational role becomes more important (i.e., as the hidden attribute is larger). Further, I show that consumer welfare is lower when intermediaries can educate consumers about the hidden attribute than when they cannot. This is because commissions for persuading intermediaries not to educate consumers increase the total prices of the products, and consumers ultimately bear the cost of such commissions. This result indicates that if deception is an issue, having expert intermediaries in a market can hurt naive consumers. I also show that conditional on deception, the ex-post utility of consumers is the same under a monopoly intermediary and multiple intermediaries. Although introducing competition among intermediaries makes deception harder to maintain, it does not increase consumer or social welfare if deception is maintained.
Section 5 discusses the possibilities and limits of policies for preventing deception. Once the difference in commissions is limited, intermediaries would try to attract consumers from competitors by educating the consumers. Therefore, caps on commissions or prohibiting large discrepancies in commissions can eliminate deception, and thereby increase welfare. This is akin to recent regulations introduced in the US mortgage industry as well as in the Australian and UK mutual-fund industries. Unlike policies that attempt to restrict hidden attributes directly, these commission regulations do not require a policymaker to identify which attribute is used to exploit consumers.\(^6\)

I also discuss the effects of regulating the maximum additional fees, letting consumers reach more intermediaries, and whether commission structures of intermediaries are disclosed or not.

Section 6 investigates two major extensions and discusses other modifications of the model. As one major extension, I analyze how competition among many firms affects consumer and social welfare. When there are multiple firms in each type of product, all firms earn zero profits. In this case, whether or not intermediaries earn positive profits from deception depends on the relative social surplus of the products. On the one hand, when the deceptive product is socially superior to the transparent one, deceptive firms compete down their product prices and commissions, intermediaries make zero profits, consumers’ ex-post utility is positive, and social welfare is maximized. On the other hand, when the deceptive product is socially inferior to the transparent product—which seems more likely in practice—intermediaries can earn positive profits by employing deception. The same trade-off and condition as in the model with one deceptive firm determine whether deception through high commissions can be maintained. If the incentive for receiving high commissions outweighs the incentive for expanding market share, then intermediaries earn positive profits from deception. Each consumer’s ex-post utility is higher than in the case with one deceptive firm, but is still negative.

As another major extension, I investigate how the presence of sophisticated consumers affects the welfare of naive consumers. Suppose that a fraction of consumers are informed in the sense that they know the existence of hidden attributes and which products have the hidden attributes. I first show that deception through high commissions can still occur if each intermediary is able to offer only one product at a time. Nevertheless, the condition for deception becomes more

\(^6\) Furthermore, this policy has a positive effect on a relevant issue: preventing firms from inventing new hidden attributes of which policymakers are not aware. If commissions are regulated, then intermediaries would detect and reveal all hidden attributes. This would eliminate firms’ incentives to invent new hidden attributes. Hence, intermediaries can work as monitoring institutions once commissions do not distort their incentives.
stringent as the fraction of informed consumers increases. I next examine a model in which each intermediary can screen consumers by offering a menu that contains one promoted product and other non-promoted products. I show that if intermediaries can conceal both the existence of non-promoted products as well as the hidden attributes of deceptive products from naive consumers, then intermediaries can profitably sort consumers. Naive consumers buy inferior deceptive products with high commissions which are promoted by intermediaries, whereas informed consumers buy superior transparent products with low commissions which are available but are not advertised by the intermediaries.

I then discuss further extensions and modifications of the model incorporating: (i) effort costs intermediaries need to pay when educating consumers, (ii) heterogeneity in consumers’ search intensity, (iii) the possibility of vertical integration, (iv) the possibility that intermediaries directly charge advising fees or give direct rebates to consumers, and (v) the possibility of promoting multiple products. Section 7 concludes. The proofs are provided in the Appendix.

2 Related Theoretical Literature

This section summarizes related theoretical literatures. I first discuss studies that are most closely related to this paper: markets with intermediation under consumer naivete. I also review studies that investigate competition under consumer naivete in a retail market, and that analyze the role of intermediaries as information providers under rational consumers. Compared to these literatures, I show that intermediaries can earn high commissions by employing deception even when they compete for consumers, identify perverse welfare effects of intermediaries who are able to educate naive consumers, and shed light on new positive aspects of commission regulations.

This paper is most closely related to a growing literature that analyzes markets with intermediaries under consumer naivete. Stoughton, Wu and Zechner (2011) investigate a model with a monopolistic financial intermediary and show that commissions are used either for price discrimination across individual wealth levels or for socially-inefficient marketing, depending on the degree of investor naivete. Bolton, Freixas and Shapiro (2012) analyze competition among credit-rating agencies with trusting investors who always take the ratings at face value. Because firms may disclose only the most favorable rating to attract naive investors, the presence of multiple (truth-telling) credit-rating agencies facilitates ratings shopping of the firms and distorts social welfare.
Hence, social welfare under duopoly credit-rating agencies can be lower than that under a monopoly credit-rating agency. Inderst and Ottaviani (2012c) analyze a market with a monopolistic intermediary and horizontally-differentiated firms. The authors show that when consumers are naive, the intermediary charges no advising fees to consumers directly but earns high commissions provided from firms, which leads to biased advice to the consumers.

This paper, as well as the papers summarized in the previous paragraph, builds on the theoretical literature investigating the effects of consumer naivety. Specifically, this paper assumes that consumers have misperceptions about certain product attributes but experts can educate them. Gabaix and Laibson (2006) develop a model with “educable” consumer naivety in a retail market. They analyze a model in which each firm sells a base product and an add-on. Naive consumers are initially inattentive to the prices of add-ons, but each firm can choose whether or not to inform both sophisticated and naive consumers about all prices of the add-ons. Because sophisticated and informed-naive consumers can substitute away from the add-on before buying a base product, such information disclosure can decrease the demand for the add-on and hence may not be profitable for firms even under competition. Building upon this insight, Heidhues et al. (2012a) investigate retail markets with a floor on a base-product price, analyze a screening problem between sophisticated and naive consumers by offering multiple products, and identify the role of socially-inferior products for maintaining profitable deception.

This paper also belongs to the literature that analyzes the role of intermediaries as information providers. Lizzieri (1999) investigates an information-disclosure problem under a monopolistic intermediary. He also shows that competition among intermediaries can lead to full information disclosure. Inderst and Ottaviani (2009) analyze how the quality of advice can be distorted from the socially optimal level when a monopolistic intermediary pays a private cost to find a potential customer. Inderst and Ottaviani (2012a) investigate a market with a monopolistic intermediary and horizontally-differentiated product providers. The authors show that the mandatory disclosure of

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9 See Gorton and Winton (2003), Dranove and Jin (2010), and Inderst and Ottaviani (2012b) for review.
commission levels can distort the efficient provision of the products when there is a cost asymmetry between firms. This is because the market share of a cost-efficient firm is below the social optimum before commission disclosure, and the disclosure further reduces the equilibrium product supply of the cost-efficient firm.

3 Model

This section introduces the model. Section 3.1 sets up the model. Section 3.2 discusses three key assumptions of the model throughout this paper.

3.1 Setup

Consider a market with two product providers: a deceptive firm (firm $D$) and a transparent firm (firm $T$). Firm $D$ charges a hidden fee $\bar{a} \geq 0$, whereas firm $T$ charges no hidden fees. Firm $x \in \{D, T\}$ sells product $x$ with value $v_x > 0$ and marginal cost $c_x > 0$. Assume that $v_D - c_D + \bar{a} > 0$ and $v_T - c_T > 0$. There is a unit mass of homogenous consumers; each of them buys at most one item. Consumers are naive but educable as in Gabaix and Laibson (2006) and Heidhues et al. (2012a): when consumers make purchase decisions, they are ignorant of $\bar{a}$ if and only if they are not educated about $\bar{a}$. For simplicity, I assume that $\bar{a}$ is exogenous and consumers cannot avoid it after the purchase. Note that firm $D$ has monopoly power for potentially exploiting consumers by $\bar{a}$; Section 6.1 analyzes a model with multiple deceptive firms in which no firm has any monopoly power.

A key feature of the model is that firms must delegate their sales to common-agent intermediaries. Let $J \geq 2$ denote the total number of intermediaries in the market. Each consumer randomly visits a fixed number $N(\leq J)$ of intermediaries. I assume $N \geq 2$ to analyze a competitive environment of intermediaries; $N$ limits each intermediary’s ability to take market share away from

10 Otherwise, some product is never profitably sold and the market becomes a monopoly. Note that product $D$ can be socially wasteful ($v_D$ can be smaller than $c_D$). Note also that I do not impose a specific relation between the social surplus of these two products ($v_D - c_D$ versus $v_T - c_T$).

11 If instead the hidden fee is avoidable and endogenously chosen by firm $D$, then the firm sets the hidden fee equal to a monopoly price after consumers are locked-in.

12 In Section 6.3, I examine a model with incorporating heterogeneity in consumers’ search intensity. Throughout this paper, I assume that the number of intermediaries each consumer visits is exogenous to analyze the effects of competition among intermediaries in a tractable way. Incorporating endogenous consumer search into the model is beyond the scope of this paper, though it is briefly discussed in Section 7.
competitors. Each intermediary chooses one product to promote, and whether or not to educate consumers about $\pi$. Each intermediary can educate all consumers who visit at zero cost. If no intermediary educates, then a consumer is ignorant of $\pi$ in her purchase decision; but if at least one intermediary educates, then she takes $\pi$ into account. I assume that consumers do not make an inference about the hidden attribute from the level of product prices or commissions. All parties are risk neutral. I employ a tie-breaking rule where intermediaries split the demand equally if they promote the same product and consumers are indifferent between buying from them.

The timing of the game is as follows:

1. Each firm $x \in \{D, T\}$ simultaneously proposes a product price $p_{xi}$ and a commission per sale $f_{xi}$ to each intermediary $i \in \{1, \ldots, J\}$.

2. After observing all of the contracts, each intermediary simultaneously chooses one product to promote, and whether or not to educate consumers about $\pi$.

3. Each consumer reaches $N$ intermediaries simultaneously and randomly, and makes a purchase decision.

4. All transactions are implemented.

The profits of firm $D$ and $T$ are respectively $p_{Di} - c_D - f_{Di} + \pi$ and $p_{Ti} - c_T - f_{Ti}$ per sale. The ex-post utility of each consumer if she buys product $D$ and product $T$ from intermediary $i$ is respectively $v_D - p_{Di} - \pi$ and $v_T - p_{Ti}$. The total profits of each intermediary are its market share times commissions. It is worth mentioning that the model captures a case in which $\pi$ is an overestimate of quality or underestimate of risk instead of a hidden fee. In such a case, a deceptive firm charges a high product price instead of an additional fee. Specifically, consider an alternative case where uneducated consumers perceive the valuation of product $D$ to be $v_D + \pi$, whereas its

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13 According to a survey reported by Lacko and Pappalardo (2007), in the US mortgage industry, consumers on average contact 2.8 mortgage lenders and brokers. Also, Woodward and Hall (2012) estimate that most consumers are likely to visit only 2 mortgage brokers for their loan originations.

14 Incorporating commission-disclosure decisions into the model does not change the analysis. For ease of exposition, I consider a case in which consumers can observe the level of commissions but do not make an inference from it. See Section 5.4 for a detailed discussion.

15 Further extensions are investigated in later sections. In Section 6.2, I incorporate consumer heterogeneity in naivete and analyze how intermediaries can screen the consumers’ degree of naivete by a menu offer. In Section 6.3, I discuss a model that incorporates positive costs for educating consumers, vertical integration, advising fees or perks intermediaries can directly set to consumers, and promoting multiple products.

16 For ease of exposition, I restrict the attention to piece-rate contracts. Given the demand structure, this restriction is without loss of generality in the model.
actual valuation is $v_D$. Then, all results from the original model remain the same once the product price of the deceptive firm is modified from $p_{D_i}$ to $p_{D_i} + \bar{a}$.

I investigate pure-strategy subgame-perfect Nash equilibria played by firms and intermediaries with the following two equilibrium refinements. First, no firm sets its total price below its total cost. Indeed, any such strategy is weakly dominated. Second, in any off-equilibrium subgame, each intermediary takes the same educational action as it takes on the equilibrium path if it is a best response. This rules out off-equilibrium coordinations of educational decisions among intermediaries.\footnote{In other words, given other intermediaries' strategies, if an intermediary chooses to educate (resp. not educate) on the equilibrium path, then the intermediary keeps choosing to educate (resp. not educate) in any other subgame whenever doing so is optimal. This refinement is akin to “no off-equilibrium signaling” assumption employed in incomplete-information games.}

For ease of exposition, I divide the set of equilibria into two types: deceptive equilibria in which some consumers remain uneducated, and non-deceptive equilibria in which all consumers are educated. In the analysis, I particularly focus on identifying conditions for and properties of deceptive equilibria. Since educating consumers is trivially a best response if all other intermediaries educate, a non-deceptive equilibrium always exists. Whenever a deceptive equilibrium exists, however, it is more plausible to be played between intermediaries than the non-deceptive equilibrium because of the following reasons. First, intermediaries earn higher profits in a deceptive equilibrium. Second, intermediaries play a weakly-dominated strategy in a non-deceptive equilibrium. Finally, if a deceptive equilibrium exists in the model, then it becomes the unique equilibrium in an extended model in which intermediaries incur a positive education cost, no matter how small the education cost is. I discuss such an extended model in Section 6.3.

3.2 Discussion of Key Assumptions

The model has three key assumptions: (i) consumers have misperceptions about a product attribute, (ii) intermediaries can educate consumers about the attribute, and (iii) without the help of intermediaries, firms cannot educate consumers about the attribute of other firms’ products. In this subsection, I discuss these assumptions in turn.

(i) In the model, $\bar{a}$ represents the amount by which a consumer misperceives the attributes of the product that can be hidden fees, qualities, or risks. As examples of hidden fees, Gurun et al. (2013) report that post-introductory interest rates of adjustable-rate mortgages are not salient due

\footnote{In other words, given other intermediaries’ strategies, if an intermediary chooses to educate (resp. not educate) on the equilibrium path, then the intermediary keeps choosing to educate (resp. not educate) in any other subgame whenever doing so is optimal. This refinement is akin to “no off-equilibrium signaling” assumption employed in incomplete-information games.}
to “deceptive advertisements,” and the advertisements lead consumers to choose worse mortgages. Woodward and Hall (2012) find that some consumers originating mortgage loans pay high broker fees because of a confusing payment scheme.\textsuperscript{18} By examining a natural experiment in the Indian mutual-fund industry, Anagol and Kim (2012) show that consumers tend to pay higher fees to mutual funds when the fees are amortized and hidden. As examples of misperceived qualities and risks, individual investors may overestimate future returns or underestimate risks of actively-managed mutual funds relative to index funds.\textsuperscript{19} Consumers may have incorrect beliefs about the likelihood of accidents covered by insurance plans. Patients may think the efficacy of a brand-name drug is better than that of a generic one with exactly the same ingredients.

Along with most studies incorporating consumer naivete, I assume that consumers do not make an inference about the hidden attribute from price or commission levels. Of course, if consumers can rationally infer, then they will notice the existence of hidden attributes when observing overly high commissions. Empirical evidence, however, suggests that consumers are often inattentive to the incentives of intermediaries.\textsuperscript{20} I return to discuss this assumption and policies on mandatory disclosure of commission structures in Section 5.4.

(ii) Helping consumers choose products is thought to be a central role of intermediaries. Doctors can teach patients which treatment is better for them, real-estate agents can tell deficiencies of a house, and financial advisors and mortgage brokers can educate consumers about the hidden costs of products. Experts in these industries are often indispensable because most consumers find it hard to choose appropriate products without the help of intermediaries. In addition, these intermediaries can provide certified information or clear analysis to modify consumers’ misperceptions, whereas providing such information is either costly or often impossible for non-experts.

To investigate the educational incentives of intermediaries in a clear manner, I assume that each intermediary can educate its customers at no cost. Note that such “perfect education” is an extreme assumption which makes a deceptive equilibrium harder to exist. In Section 6.3, I examine

\textsuperscript{18} Specifically, Woodward and Hall (2012) report that consumers who compensate a mortgage broker with both a direct cash payment and a commission from a mortgage lender pay twice as much as similar consumers who pay with cash alone or with a commission alone.

\textsuperscript{19} Studies by Malkiel (1995), Gruber (1996), and French (2008) report that actively-managed mutual funds underperform index funds after fees are taken into account. Furthermore, Gil-Bazo and Ruiz-Verdú (2009) report that mutual funds charging higher fees tend to have worse before-fee risk-adjusted performance.

\textsuperscript{20} Malmendier and Shankhikumar (2007) report that small investors literally follow the stock recommendations of security analysts, though the recommendations of the analysts have an upward bias. Christoffersen et al. (2013) report that in the US mutual-fund industry, a 1% point increase in commissions leads to a 0.4464% increase in annual fund flows, while the increase in commissions predicts a 0.34% decrease in future performance net of fees.
how results are robust to incorporating costly education.

(iii) This paper focuses on markets in which expert intermediaries are indispensable for some consumers. Section 4.1 demonstrates that if firms can directly educate most consumers about other firms’ product attributes, then a non-deceptive firm would always educate. For the industries illustrated above, however, some consumers are unwilling to buy products without consulting experts because stakes are large and product attributes are complicated. For example, mortgages have hundreds of thousands of dollars at stake, and their contracts are hundreds of pages long—far beyond the limits of comprehension for many consumers. To educate consumers in these markets, a non-deceptive firm needs either to hire or train in-house intermediaries. In either case, the total cost seems the same as, or higher than, that of using existent intermediaries. In Section 6.3, I discuss how results of the model are robust to incorporating such possibilities of vertical integration.\textsuperscript{21}

4 Analysis

This section analyzes equilibria of the model and derives welfare implications. Section 4.1 presents two benchmark cases. Section 4.2 investigates the model, identifies a condition under which a deceptive equilibrium exists, and discusses its implications. Section 4.3 analyzes welfare effects on intermediaries’ educational role and on the presence of competition among intermediaries.

4.1 Benchmark Cases

Before the main analysis, I first analyze two benchmark cases: a case where firms can directly market to consumers and a case where consumers do not have misperceptions. In Section 4.3, I investigate further benchmark cases—a case where neither firms nor intermediaries can educate consumers and a case where intermediaries have monopoly power—and discuss their welfare implications.

Equilibrium When Intermediaries Are Not Necessary

I first analyze a benchmark case in which consumers are naive and firms directly market to the consumers, which is a variant of an extended model in Heidhues et al. (2012a) where some firm

\textsuperscript{21} Beyond the model, it is possible that non-deceptive firms can use mass advertisements to educate consumers. In that case, however, deceptive firms and intermediaries can also use “counter-advertisements.” Further, if profitable deception can occur, then deceptive firms and intermediaries have more resources to make naive consumers confused. Hence, education can be difficult without a direct consultation with an expert.
produces only a socially-superior transparent product. Firm \( x \in \{D, T\} \) simultaneously chooses its price \( p_x \) and whether or not to educate consumers about the hidden attribute of firm \( D \). In this case, there always exists a Nash equilibrium played by firms in which firm \( T \) educates consumers about \( \bar{a} \) and a firm with a lower social surplus chooses marginal-cost pricing. This comes from the fact that once consumers are educated, the game reduces to one with Bertrand-type price competition in a vertically-differentiated market.

Suppose there exists a deceptive equilibrium. Since firms are facing Bertrand-type price competition, in equilibrium each consumer is indifferent between buying product \( D \) and \( T \) without taking \( \bar{a} \) into account:

\[
v_D - p_D^* = v_T - p_T^*.
\]

In addition, at least one firm employs marginal-cost pricing; otherwise, some firm would profitably undercut the other firm. That is, either \( p_D^* = c_D - \bar{a}, p_T^* = v_T - (v_D - c_D) - \bar{a} \) or \( p_D^* = v_D - (v_T - c_T) \), \( p_T^* = c_T \) holds in any equilibrium. In either case, by educating consumers, firm \( T \) can charge a higher price and still attract all of them. Proposition 1 summarizes the result:

Proposition 1 (Equilibrium When Intermediaries Are Not Necessary). Suppose firms directly market to consumers, and make pricing and educating decisions at the same time. Then, all consumers are educated in any equilibrium.

Equilibrium without Naivete

Next, suppose that firms sell their products through intermediaries but all consumers are informed about the hidden attribute. These informed consumers observe which product has \( \bar{a} \). In this case, a standard Bertrand-type competition argument applies as summarized in Proposition 2.

Proposition 2 (Equilibrium without Naivete). Suppose firms market through intermediaries and all consumers are informed. Then, in any equilibrium, only the product with higher social surplus is sold and all intermediaries earn zero profits. The consumers’ ex-post utility is non-negative.

\(^{22}\) In the Supplementary Material, I show that how the result of Proposition 1 is robust to the different specifications of timing between pricing and educating decisions.

\(^{23}\) Precisely, there exists a non-deceptive equilibrium such that \( p_D^* + \bar{a} = c_D, p_T^* = \min\{v_T, v_T - (v_D - c_D)\} \) and all consumers buy firm \( T \)'s product if \( v_D - c_D \leq v_T - c_T \), whereas \( p_D^* + \bar{a} = v_D - (v_T - c_T), p_T^* = c_T \) and all consumers buy firm \( D \)'s product if \( v_D - c_D > v_T - c_T \).

\(^{24}\) Note that the proposition is stated in terms of utility and profits rather than what intermediaries actually do. There is a non-essential multiplicity of equilibria due to the fact that intermediaries make zero profits. This multiplicity affects none of the equilibrium outcomes.
In the Supplementary Material, I show that the result remains the same if instead consumers anticipate the existence of a hidden attribute but do not know which product has the hidden attribute. In this case, a firm who has no hidden attribute always induces intermediaries to educate consumers about the other firm’s attribute because the education would increase consumers’ willingness to pay for its product. It leads that when intermediaries do not educate, they always promote a product with the hidden attribute. Hence, anticipated consumers always know which product has the hidden attribute based on the intermediaries’ educational decisions.

4.2 Equilibria in the Model

Now I investigate the model presented in Section 3.1: firms sell products through intermediaries and consumers are naive. I first derive conditions for equilibria in which all intermediaries promote the deceptive product without educating consumers, and show that such a fully deceptive equilibrium is unique and is characterized by $p^*_T = v_T$, $f^*_T = v_T - c_T$, $p^*_D = v_D$, and $f^*_D = N(v_T - c_T)$.

Suppose an equilibrium exists in which all intermediaries promote the deceptive product without educating consumers. Let $l$ be an intermediary to whom firm $T$ proposes its lowest product price: $p_{TL} \equiv \min_s p_{Ts}$. First, $p^*_T \leq v_T$ in any equilibrium. Also, $v_D - p^*_D \leq v_T - p^*_T$ for all $i$; otherwise firm $D$ can profitably increase $p^*_D$ by a bit. These two inequalities imply that if intermediary $l$ educates consumers and promotes product $T$, then all consumers who visit intermediary $l$ strictly prefer to buy it from intermediary $l$. It leads that $(1/J)f^*_D \geq (N/J)f^*_T$; otherwise intermediary $l$ would educate consumers and sell product $T$. Also, $(1/J)f^*_D \leq (N/J)f^*_T$; otherwise firm $D$ can profitably decrease its commissions without inducing intermediaries’ deviations. Thus,

$$f^*_D = Nf^*_T. \tag{1}$$

Given Equality (1), firm $T$ cannot profitably increase $f^*_T$ in equilibrium; otherwise firm $T$ would increase $f^*_T$ by a bit and let intermediaries promote product $T$. Hence,

$$f^*_T = p^*_T - c_T. \tag{2}$$

Also, $p^*_T < v_T$ does not occur in equilibrium because then firm $T$ can profitably induce intermediary $l$ to educate consumers and promote product $T$ by increasing $p^*_T$ by $2\epsilon$ and $f^*_T$ by $\epsilon$ for sufficiently

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25 Suppose not. Then, consumers do not buy product $T$ from intermediary $l$ even when they are educated, and hence firm $D$ would set $p_{Di} = v_D$ and $f_{Di} = 0$ for all $i$. But then firm $T$ can profitably deviate by offering $p^*_{Ti} = v_T - \epsilon$, $f^*_{Ti} = \epsilon$ for small $\epsilon > 0$. 

13
small $\epsilon > 0$. Thus,

$$p_{Ti}^* = v_T.$$  \hspace{1cm} (3)

Combining equality (3) and $v_D - p_{Di}^* \leq v_T - p_{Ti}^*$ for all $i$ yields $p_{Di}^* \geq v_D$ for all $i$. Since consumers buy product $D$, their perceived utility of buying it must be non-negative. Hence,

$$p_{Di}^* = v_D.$$  \hspace{1cm} (4)

Equalities (1) to (4) uniquely pin down the contracts to intermediary $l$: $p_{Ti}^* = v_T$, $f_{Ti}^* = v_T - c_T$, $p_{Di}^* = v_D$, $f_{Di}^* = N(v_T - c_T)$. Since $p_{Ti}^*$ is the lowest product price of firm $T$, $p_{Di}^* = v_D$ and $f_{Di}^* = N(v_T - c_T)$ hold for all $i$; otherwise firm $T$ can profitably deviate by letting $i$ educate consumers and promote product $T$. Also, $p_{Ti}^* = v_T$ and $f_{Ti}^* = v_T - c_T$ for all $i$; otherwise firm $D$ can profitably decrease its commission to $i$. Hence, if all intermediaries promote the deceptive product without educating consumers, then the equilibrium is unique among all deceptive equilibria: $p_{Ti}^* = v_T$, $f_{Ti}^* = v_T - c_T$, $p_{Di}^* = v_D$, $f_{Di}^* = N(v_T - c_T)$ for all $i$.

Notice that neither firm $T$ nor intermediaries have incentives to deviate. Firm $D$ has an incentive to follow the above strategy when the following two conditions hold. First, firm $D$ earns non-negative profits given the above strategies: $p_{Di}^* + \bar{\sigma} - c_D - f_{Di}^* \geq 0$. Second, the difference of commissions is not larger than the profits from deception: $\bar{\sigma} \geq f_{Di}^* - f_{Ti}^*$; otherwise, firm $D$ would set $p_{Di}^* = v_D - \bar{\sigma} - \epsilon$, $f_{Di}^* = f_{Ti}^* + \epsilon$ for sufficiently small $\epsilon > 0$ and let intermediaries educate consumers and promote product $D$. By combining these two inequalities, I obtain the following “Condition for Deception”:

$$\min\{v_D - c_D, v_T - c_T\} + \bar{\sigma} \geq N(v_T - c_T).$$  \hspace{1cm} (CD)

The deceptive equilibrium exists if and only if Condition (CD) holds. Notice that in this equilibrium, naive consumers’ ex-post utility is $-\bar{\sigma} < 0$, firm $D$ earns positive profits if Condition (CD) holds with strict inequality, firm $T$ has zero market share, and each intermediary has $1/J$ of the market share and earns $N(v_T - c_T)/J > 0$ of total profits.

In the Appendix, I show that in any deceptive equilibrium, all intermediaries promote the deceptive product and all consumers are uneducated. Also, if all consumers are educated about $\bar{\sigma}$, then commissions are competed away as in Proposition 2. Since deceptive equilibria and non-deceptive equilibria are jointly exhaustive by definition, these considerations lead to complete characterization of the equilibria in the model:
Proposition 3 (Equilibria in the Model). Suppose firms market through intermediaries and all consumers are naive.

(i) A deceptive equilibrium exists if and only if Condition (CD) holds. If the deceptive equilibrium exists, then it is unique among deceptive equilibria: \( p^*_T = v_T, f^*_T = v_T - c_T, p^*_D = v_D, f^*_D = N(v_T - c_T) \) for all \( i \). In the equilibrium, all consumers receive ex-post negative utility. Each intermediary promotes the deceptive product without educating consumers and earns positive profits. The deceptive firm earns positive profits if Condition (CD) holds with strict inequality. The non-deceptive firm has zero market share. Social welfare is not maximized when \( v_D - c_D < v_T - c_T \).

(ii) A non-deceptive equilibrium always exists and its outcome is unique among non-deceptive equilibria. In the equilibrium, all consumers are educated, intermediaries earn zero profits, and social welfare is maximized.

By Condition (CD), holding other parameters constant, deception occurs if and only if the amount of the hidden attribute is large. In the deceptive equilibrium, each intermediary faces a key trade-off between market share and the level of commissions. On the one hand, an intermediary can increase its market share by educating consumers and attracting them from other intermediaries. On the other hand, an intermediary can earn higher commissions per customer by not educating consumers and selling the deceptive product. As a result, deception occurs if the profits from the hidden attribute allow the deceptive firm to give each intermediary a sufficiently high commission with which the transparent firm cannot compete.

If deception occurs, then having competition among intermediaries does not lower the level of commissions. This is because the deceptive firm needs to give each intermediary a high commission to maintain deception.\(^26\) This result brings a new insight to the relation between commissions and the role of intermediaries: although high commissions in classical models often imply that intermediaries provide valuable or high-cost services to their customers, disproportionately high commissions may indicate that intermediaries promote products in a socially-inefficient way. This

\(^{26}\) The intuition of why high commissions can be sustained under competition among intermediaries is close to Besley and Prat (2006) and Asker and Bar-Isaac (2013). Besley and Prat (2006) show that a government has an incentive to give medias sufficiently high bribes in order to prevent these medias from broadcasting bad news. Asker and Bar-Isaac (2013) show that in a repeated-game framework, a monopolistic up-stream firm may give retailers sufficiently high transfers so that no retailer would accommodate potential up-stream entrants. In these papers, however, all parties are rational and hence welfare and policy implications are different from my paper. Also, their results would be different when there are many firms or heterogenous consumers, whereas I analyze these extensions and show the robustness of my results in Section 6.
result can help explain why actively-managed mutual funds and option adjustable-rate mortgages are able to profitably charge higher total prices than alternative products, such as index funds and fixed-rate mortgages.

Deception may severely harm consumer and social welfare. If Condition (CD) holds, then the deceptive firm can profitably sell an inferior product (i.e., \( v_D - c_D < v_T - c_T \)), leading to suboptimal social and consumer welfare. Moreover, the deceptive firm can profitably sell its product even when the product is socially wasteful (i.e., \( v_D - c_D < 0 \)). Deception enables the survival of products that should not exist in the market.

Deception becomes less likely to occur as consumers’ search intensity, \( N \), increases. Conditional on deception, however, increasing the search intensity further raises the level of commissions. Figure 1 describes comparative statics on \( N \) when \( v_D - c_D = v_T - c_T = 1 \). As \( N \) increases, educating consumers becomes more attractive to each intermediary. To maintain deception, therefore, the deceptive firm must give a higher commission at the expense of own profits. Once the commission becomes so high that the deceptive firm cannot profitably maintain deception, deception is eliminated and commissions are competed down. As a result, \( N \) has a non-monotonic effect on the level of commissions.\(^{27}\) Similarly, so long as Condition (CD) holds, the level of commissions is increasing in the social surplus of the transparent product \((v_T - c_T)\). As an alternative product becomes more attractive, a deceptive firm needs to give higher commissions in order to maintain deception.

![Figure 1: The equilibrium commission \((f^*_D)\) and profits \((\pi^*_D)\) as a function of consumers’ search intensity \((N)\) when \(v_D - c_D = v_T - c_T = 1\).](image)

\(^{27}\) Notice that \(N\) does not depend on the total number of intermediaries, \(J\), but on how many intermediaries consumers visit. Section 5.3 discusses policies that enhance the access to intermediaries.
If Condition (CD) does not hold, then all consumers are educated about the hidden attribute, intermediaries earn zero profits, and social welfare is maximized. Hence, deception is a concern when and only when consumer misperception is substantial. On the one hand, Condition (CD) holds only when \( \bar{a} \geq v_T - c_T \). This indicates the lack of “minor” deception: intermediaries educate consumers about small misperceptions under competition. On the other hand, Condition (CD) implies that the more important the educational role of intermediaries is (the higher \( \bar{a} \) is), the less likely the intermediaries serve their role (educating consumers about \( \bar{a} \)). Intermediaries’ educational role works perversely when deception is a concern. Section 4.3 further investigates the welfare effect on the educational role of intermediaries.

One can also think that some intermediaries care about honesty or reputation. As a natural extension of the model, consider each intermediary incurs cost \( \rho > 0 \) when it does not educate consumers, where \( \rho \) represents a dishonesty or reputation cost.\(^{28}\) In this case, a deceptive firm needs to give each intermediary a commission \( N(v_T - c_T) + \rho \) to maintain deception. Although the honesty concern makes deception less likely to occur, conditional on deception it further raises the level of commissions. Intuitively, if intermediaries incur disutility from deception, then deceptive firms need to compensate the intermediaries more. Further, I show in Section 6.1 that when the honesty concern fails to generate market transparency, the honesty concern can actually decrease consumer welfare through the increase of commissions.

### 4.3 Welfare Effects of Intermediaries

This subsection highlights two significant welfare effects of intermediaries under deception. Notice that if Condition (CD) does not hold, then intermediaries educate all consumers. In this case, consumers are not exploited and commissions are competed down. When Condition (CD) holds, however, perverse welfare effects arise due to the presence of expert intermediaries.

I first examine the effect on the educational role of intermediaries. To investigate it, consider an alternative case where consumers are naive and intermediaries cannot educate consumers about the hidden attribute. When Condition (CD) is satisfied, all consumers buy the deceptive product. Since no one can educate consumers in such a case, of course deception occurs. In this case, however, the deceptive firm can profitably decrease its commissions without the threat of education. Hence,

\(^{28}\) See, for examples, Bolton et al. (2012) and Inderst and Ottaviani (2009, 2012c) for studies incorporating such a reputation cost.
commissions are competed down to zero in any equilibrium. The non-deceptive firm sets marginal-cost pricing as in classical Bertrand-competition models. Consumers are indifferent between the deceptive product and non-deceptive product, without taking the hidden cost into account. Hence, consumers’ ex-post utility in this case is the social surplus of the alternative non-deceptive product minus the hidden cost: \((v_T - c_T) - \bar{\pi} < 0\). Notice that it is larger than \(-\bar{\pi}\), i.e., the ex-post utility under deception in the model where intermediaries can educate consumers is lower than in the alternative case where intermediaries cannot educate.

**Proposition 4** (Welfare Effect on the Educational Role of Intermediaries). Suppose Condition (CD) holds. Then, consumer welfare is lower when intermediaries can educate consumers about the hidden attribute than when they cannot.

Proposition 4 demonstrates that the existence of intermediaries, who can educate consumers, may decrease consumer welfare. This result indicates a perverse welfare effect on the educational role of intermediaries. To see the intuition, notice again that commissions are competed down to zero when intermediaries cannot educate consumers. To maintain deception, in contrast, high commissions are paid to intermediaries when they can educate consumers. Consumers buy the deceptive product in both cases, but in the latter case the consumers ultimately bear the cost of high commissions through the increase of the total prices of products. Hence, conditional on deception, consumer welfare is lower in the model where intermediaries can educate consumers compared to the alternative case where intermediaries cannot educate. When deception is an issue, experts may make consumers worse off due to the misalignment of educational incentives.

I next discuss the effect on the presence of competition among intermediaries. Suppose a modified model in which each consumer visits only one intermediary \((N = 1)\). Since there is no competition among intermediaries, each intermediary promotes product \(D\) if and only if \(v_D - c_D + \bar{\pi} \geq v_T - c_T\); the inequality is satisfied when Condition (CD) holds.\(^{29}\) The equilibrium in this case is \(p_{Di} = v_D, f_{Di} = v_T - c_T, p_{Ti} = v_T, f_{Ti} = v_T - c_T\), and each intermediary \(i\) promotes the deceptive product without educating consumers. Consumers’ ex-post utility in this case is \(-\bar{\pi}\), which is the same as in the model under multiple intermediaries.

**Proposition 5** (Welfare Effect on the Presence of Competition among Intermediaries). Suppose

\(^{29}\) If \(v_D - c_D + \bar{\pi} < v_T - c_T\), then the monopolistic intermediary promotes the transparent product and consumers’ ex-post utility is zero.
Condition (CD) holds. Then, the ex-post utility of consumers is the same under a monopoly intermediary and under multiple intermediaries.

Proposition 5 sharply contrasts with the predictions from models of rational consumers with $v_D - c_D > 0$, where consumers get zero utility under a monopoly intermediary but get positive utility under competition among intermediaries. When consumers have misperceptions, having competition among intermediaries may not benefit consumers at all. The condition for deception, however, becomes stringent as $N$ increases. Therefore, introducing competition among intermediaries in the model either makes the market transparent or does not increase consumer and social welfare.

5 Policy Analysis

This section discusses various policy interventions. Section 5.1 analyzes policies regulating commissions. Section 5.2 discusses direct regulations on the hidden attribute. Section 5.3 examines policies that lead consumers to reach more intermediaries. Section 5.4 discusses mandatory disclosure of commission structures.

5.1 Regulating Commissions

This subsection discusses regulations on commissions. In the model, a simple intervention can eliminate deception. Suppose a policymaker caps the level of commissions. Under this regulation, intermediaries always educate consumers in order to increase market share:

**Proposition 6** (Regulating Commissions). Suppose commissions are restricted to $f_{xi} < N(v_T - c_T)$ for all $x, i$. In any equilibrium, all consumers are educated about the hidden attribute, intermediaries earn zero commissions, and social welfare is maximized.

Proposition 6 shows that a direct price control on commissions in a competitive environment may increase welfare. Once the difference in commissions is restricted, intermediaries cannot get much higher commissions from deception. Hence, intermediaries choose to educate consumers about the hidden attribute in order to increase their market share. If Condition (CD) holds, then the ex-post utility of consumers increases from $-\bar{u}$ to $\min\{\max\{0, v_D - c_D\}, v_T - c_T\} \geq 0$ by the
regulation. Social welfare also increases when $v_D - c_D < v_T - c_T$, because consumers always buy a product with a higher social surplus under the regulation.

As real-world examples, commissions were recently banned in the Australian and UK mutual-fund industries. The UK Financial Services Authority banned commissions “to address the potential for adviser remuneration to distort consumer outcomes” effective in January 2013.\textsuperscript{30} Also in the pharmaceutical industry, doctors are not allowed to receive direct commissions from pharmaceutical companies in many countries. Proposition 6 shows that such policies can increase consumer and social welfare when deception is a concern.\textsuperscript{31}

An alternative regulation—analogous to a recent policy in the US mortgage industry—is to set a uniform commission in a market. In 2011, “to protect mortgage borrowers from unfair, abusive, or deceptive lending practices,” the Federal Reserve Board prohibited compensation to a mortgage broker based on terms or conditions of a mortgage transaction.\textsuperscript{32} If commissions are regulated to be uniform across products in the model ($f_{Di} = f_{Ti}$), then intermediary $i$ has no incentive to conceal the hidden attribute. Note that this policy does not regulate the “level” of commissions because the intent of the policy is to disallow price discrimination by commissions.

As a potential advantage, regulating commissions requires policymakers to have less knowledge about hidden attributes than regulating the attributes directly. In order to regulate a product attribute itself, policymakers need to know which attributes are used by firms to exploit consumers (discussed in Section 5.2). In contrast, so long as policymakers know deception is an issue in a market, they do not need to identify how firms exactly exploit consumer misperceptions in order to employ commission regulations.

Furthermore, regulating commissions has a positive effect on another relevant issue on deception: preventing firms from inventing new consumer-exploiting technologies. Suppose that before the price-setting stage, the deceptive firm is able to engage in “exploitative innovation” with a positive innovation cost $I_a > 0$ that increases the maximum hidden payment by $\Delta a > 0$. Assume that

\textsuperscript{30} Inducements Rules and the Retail Distribution Review Adviser Charging Rules, Financial Services Authority (October 1, 2012). Also, the Australian government banned commissions to “encourage financial advisers to become more client-focused” effective in July 2013: \url{http://futureofadvice.treasury.gov.au/content/Content.aspx?doc=faq.htm#_What_are_the_1}.

\textsuperscript{31} Precisely, banning commissions does not necessarily predict educating consumers in the model. This is because given the regulation, intermediaries are indifferent between promoting deceptive products and promoting non-deceptive products. However, if intermediaries incur a reputation or honesty cost by not educating consumers, then—no matter how small the cost is—all consumers are educated under the regulation.

the innovation is appropriable (i.e., other firms cannot copy the innovation). The next corollary highlights the positive role of intermediaries when commissions are regulated:

**Corollary 1 (Exploitative Innovation).** Suppose Condition (CD) holds in the model. Consider an extended model in which firm D has an opportunity to increase the amount of the hidden attribute from $\pi$ to $\pi + \Delta a$ by paying an investment cost $I_a > 0$ prior to the price-setting stage.

(i) If there is no regulation, then firm D invests in the innovation if and only if $I_a \leq \Delta a$. Consumers’ ex-post utility is $-\pi - \Delta a$ if the investment takes place and is $-\pi$ otherwise. Social welfare is not maximized if $v_D - c_D < v_T - c_T$ or $I_a \leq \Delta a$.

(ii) If commissions are regulated to $f_{xi} < N(v_T - c_T)$ for all $x$ and $i$, then firm D never invests in the innovation. Consumers’ ex-post utility is non-negative. Social welfare is maximized.

Corollary 1 (i) shows that welfare-harming innovations can occur in the absence of regulation. Since the increase in $\pi$ enables one-to-one transfer from naive consumers to deceptive firms, the deceptive firms have a strong incentive to invent a new consumer-exploiting technology. Such an investment is a pure waste from a social perspective. Moreover, it implies a vicious cycle of deception: once the hidden attribute is large enough, deception takes place, and the profits from deception further finances the development of deception, and so forth.

In contrast, Corollary 1 (ii) shows that deceptive firms do not invest in exploitative innovations because intermediaries would educate consumers about new hidden attributes under commission regulations. Hence, intermediaries can improve welfare through their educational role under commission regulations. So long as commissions do not distort the incentive of intermediaries, policymakers may want to have intermediaries because of problems of hidden attributes.

To the best of my knowledge, this is the first theoretical result of which policymakers can prevent firms from inventing unanticipated hidden attributes. Though there is a potentially huge welfare loss, this problem has not been investigated in the literature. Recently, innovations of hidden fees seem to be occurring in the credit-card, mortgage, and mutual-fund markets. Corollary 1 shows a positive aspect of regulating commissions that discourages firms from inventing new hidden fees. However, intermediation does not seem to play a central role specifically in the credit-card market.

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33 Heidhues, Kőszegi and Murooka (2012b) investigate innovation incentives of deceptive firms in a retail market. By focusing on the appropriability of the innovation, Heidhues et al. (2012b) highlight pervasive effects of innovation incentives when the up-front prices of the products are binding from below.

34 See, for examples, Bar-Gill and Bubb (2012), Bar-Gill (2009), and Anagol and Kim (2012).
and a policymaker needs some other interventions to prevent deception in the market. Hence, this kind of policy works only when intermediation has a key role in a market.

One caveat regarding commission regulations is that, as Inderst and Ottaviani (2012c) and others point out, such regulations may create moral-hazard problems for intermediaries. For example, commission regulations may decrease intermediaries’ incentives to search for better products for each of their customers. In contrast, exploitative innovations can be regarded as the moral-hazard problem for deceptive firms, which arises due to the possibility of deception.

5.2 Regulations on Hidden Attributes

This subsection discusses regulations that directly decrease the maximum amount of hidden attributes.35 Notice that in the deceptive equilibrium, the profits of the deceptive firm and each intermediary are respectively \((v_D - c_D) - N(v_T - c_T) + \bar{\pi}\) and \(N(v_T - c_T)\), and the ex-post utility of consumers is \(-\pi\). Hence, the decrease in \(\pi\) benefits consumers one-to-one. Akin to Heidhues and Kőszegi (2010) and Heidhues et al. (2012a), this insight provides a counter-example to a popular argument against the Credit CARD Act and other consumer-protection regulations that the costs firms incur due to a regulation will be passed on to consumers. Further, a decrease in \(\pi\) makes Condition (CD) less likely to hold. Once Condition (CD) is not satisfied, the market becomes non-deceptive, the level of commissions drops, and welfare is improved.

In contrast to the commission regulations described in the previous subsection, a policy decreasing \(\pi\) is effective even when deceptive firms can give secret bribes to intermediaries. There are some potential drawbacks, however. It might be hard for a policymaker to identify which attributes are used to exploit consumers. Also, deceptive firms still have strong incentives to invent new hidden attributes that policymakers do not anticipate.

5.3 Enhancing Access to Intermediaries

As discussed in Section 4.2, an increase in \(N\) makes deception less likely to occur. On the one hand, Proposition 3 highlights the welfare increase when the number of intermediaries increases

\[35\] Although employing such regulations seem difficult in general, it may be possible in some specific cases. For example, the Credit Card Accountability, Responsibility, and Disclosure (Credit CARD) Act of 2009 limits late-payment penalties and other fees. This act prevents credit-card companies from charging high additional payments. See Bar-Gill and Bubb (2012) for detailed discussion.
beyond a critical threshold. On the other hand, the increase in \( N \) does not affect consumer and social welfare so long as Condition (CD) holds.

It is worth mentioning that the policy increasing consumers' search intensity is robust to secret bribing and to the detailed knowledge of which attributes are hidden. However, the policy has at least one potential drawback: firms have strong incentives to invent new hidden attributes. Moreover, Section 6.1 and 6.2 show that in extended models, conditional on deception occurring the increase in \( N \) further harms naive consumers.

Relatively, regulations of disallowing exclusive dealings, as in the pharmaceutical industry, could be harmful to naive consumers because non-deceptive firms may not be able to sell their products under common agencies. In my model, allowing exclusive dealing is beneficial to consumers when (and only when) intermediaries affiliated with a non-deceptive firm reach a fraction of consumers, as discussed in Section 6.3.

5.4 Mandatory Disclosure of Commission Structure

In the model, naive consumers do not infer the existence of hidden attributes from product prices or commissions. If consumers can rationally anticipate the existence of hidden attributes from observing high commissions, then mandatory disclosure of commission structures is effective to eliminate deception. As a potential advantage, this policy does not require the detailed knowledge of the hidden attributes.

Evidence suggests that, however, people often do not rationally infer how the advice of experts is distorted from observable information.\(^{36}\) Daniel, Hirshleifer and Teoh (2002) extensively discuss investor credulity in financial markets. Experimental evidence provided by Cain, Loewenstein and Moore (2005) suggests that people under-infer the strategic response of intermediaries. As empirical evidence, Malmendier and Shanthikumar (2007) show that small investors are inattentive to the systematic upward bias of stock recommendations of analysts. These investors also fail to utilize the information about affiliations of the analysts, even though affiliated analysts have a stronger upward bias than unaffiliated analysts.

Also, if consumers misinterpret the value of the products from observable information, then

\(^{36}\) Eyster and Rabin (2005) develop a model where a player does not rationally infer how other players’ actions depend on their own situations. By applying this model, Eyster, Rabin and Vayanos (2013) analyze an asset-pricing market in which traders fail to take into account the informational content of prices.
the disclosure of commission structure may not work well. For example, individual investors might naively guess that high commissions of mutual funds predict high performance, whereas Christoffersen et al. (2013) report that the high commissions actually predict future low performance. Finally, Section 6.2 shows that if such disclosure makes only a small fraction of naive consumers sophisticated and is not enough to eliminate deception, then the disclosure can decrease consumer and social welfare.

6 Extensions

This section analyzes extensions of the model. Section 6.1 investigates a model incorporating competition among deceptive firms. Section 6.2 examines models incorporating consumer heterogeneity in naivete. Section 6.3 discusses other extensions and modifications of the model.

6.1 Competition among Deceptive Firms

This subsection analyzes a modification of the model in which there are multiple deceptive firms as well as multiple non-deceptive firms in a market.\footnote{The analysis does not essentially change when there are multiple deceptive firms and one non-deceptive firm.} I focus on identifying conditions for deceptive equilibria in which each type of firm chooses the same strategy and consumers buy deceptive products. Suppose such a deceptive equilibrium exists. Note that in this model, the equilibrium profits of each deceptive firm must be zero ($f_{Di}^* = p_{Di}^* - c_D + \bar{a}$); otherwise, each of them can increase its commission by a bit and expand its market share discontinuously.

First, suppose $f_{Di}^* = 0$ for all $i$. Then, $p_{Di}^* = c_D - \bar{a}$. In this case, non-deceptive firms do not deviate if $v_D - c_D \geq v_T - c_T$; otherwise, they can profitably deviate by setting $p_{Ti}^* = \min\{v_T - (v_D - c_D) + 2\epsilon, v_T\}$, $f_{Ti}^* = \epsilon$ for sufficiently small $\epsilon > 0$. In the Appendix, I show that if $v_D - c_D > v_T - c_T$, then in any equilibrium consumers buy product $D$ with $(f_{Di}^*, p_{Di}^*) = (0, c_D - \bar{a})$ and receive ex-post positive utility.

Second, suppose $f_{Di}^* > 0$ for some $i$. As in Section 4.2, a candidate of such a deceptive equilibrium can be pinned down to $p_{Ti}^* = v_T, f_{Ti}^* = v_T - c_T, p_{Di}^* = c_D - \bar{a} + N(v_T - c_T), f_{Di}^* = N(v_T - c_T)$. Notice that under these strategies, neither non-deceptive firms nor intermediaries have an incentive to deviate if Condition (CD) hold. Deceptive firms do not deviate if $v_D - c_D \leq v_T - c_T$; otherwise, they can profitably deviate by setting $p_{Di}^* = c_D - \bar{a} + f_{Di}^* - \epsilon, f_{Di}^* = f_{Ti}^* - 2\epsilon$ for sufficiently
small $\epsilon > 0$. In this deceptive equilibrium, no firm earns positive profits, each intermediary earns $N(v_T - c_T) > 0$ per sale, and consumers’ ex-post utility is $(v_D - c_D) - N(v_T - c_T) < 0$. Proposition 7 summarizes these results:

**Proposition 7** (Equilibria under Competition among Deceptive Firms). Suppose multiple firms exist for each type.

(i) If $v_D - c_D > v_T - c_T$, then in any equilibrium all intermediaries and firms earn zero profits. Consumers’ ex-post utility is positive. Social welfare is maximized.

(ii) If $v_D - c_D \leq v_T - c_T$, then there exists a deceptive equilibrium in which all intermediaries earn positive profits when Condition (CD) holds. All firms earn zero profits. Consumers’ ex-post utility is negative. Social welfare is not maximized if $v_D - c_D < v_T - c_T$.

Proposition 7 sharply illustrates the relation between profitable deception and selling inferior products. On the one hand, if deceptive products are superior to transparent products, then competition among deceptive firms leads them to decrease prices and commissions, and all profits from deception are passed back to the consumers. Neither firms nor intermediaries earn positive profits. Since all consumers buy deceptive products which are socially superior, social welfare is maximized. On the other hand, if deceptive products are inferior to transparent products, the same trade-off between the level of commissions and market share highlighted in Section 4.2 can still arise. It is worth emphasizing that high commissions can be kept in the equilibrium even when neither intermediaries nor firms have monopoly power. Intuitively, the threat of educating consumers and promoting non-deceptive products prevents deceptive firms from decreasing commissions. Notice that consumers’ ex-post utility in Proposition 7 (ii) is negative but larger than that in Proposition 3 (i). Competition among deceptive firms increases naive consumer’s ex-post utility, though the utility is still negative under profitable deception.

Some empirical studies suggest a link between profitable deception and selling inferior products. In the mutual-fund industry, Gil-Bazo and Ruiz-Verdú (2009) report that mutual funds charging higher fees have worse before-fee risk-adjusted performance—product prices negatively reflect their valuations. Also, Del Guercio and Reuter (2012) find that actively-managed mutual funds which are recommended by financial advisors significantly underperform alternative options such as index funds.

As discussed in Section 4.2, the level of commissions is increasing in $(v_T - c_T)$ or $N$ conditional
on deception. In addition, when there is competition among deceptive firms, the consumers’ ex-
post utility is *decreasing* in the social surplus of transparent products so long as Condition (CD) is
satisfied. This is because as the social surplus of non-deceptive products increases, each deceptive
firm needs to give more commissions to intermediaries in order to maintain deception. This increases
the level of commissions, and naive consumers ultimately bear the cost of such commissions through
the increase of product prices. Similarly, the consumers’ ex-post utility is *decreasing* in \( N \) so long
as Condition (CD) is satisfied. Policies encouraging more access to intermediaries may hurt naive
consumers if it is not sufficient to generate transparency in the market.

### 6.2 Heterogenous Consumers

This subsection analyzes markets with consumer heterogeneity in naivete. Suppose there is com-
petition among each type of firm as in Section 6.1. Assume that a fraction \( \sigma \in (0, 1) \) of consumers
are informed as defined in Section 4.1: they know which products have the hidden attributes. The
remaining fraction \( 1 - \sigma \) of consumers are naive.

Under heterogenous consumers, equilibrium outcomes depend on how intermediaries can market
products. I call that an intermediary *offers* a product when the product is on the menu but is
obfuscated, and that an intermediary *promotes* a product when the product is explicitly shown to
consumers. I first discuss a model in which each intermediary can offer only one product at a time.
I then analyze a model in which each intermediary can offer multiple products to all consumers at a
time and can sort between naive and informed consumers by shrouding (i.e., hiding) non-deceptive
products as well as the hidden attributes of deceptive products. I assume that \( v_D - c_D \leq v_T - c_T \)
throughout this subsection.\(^\text{38}\)

#### Single-Product Offer

Suppose each intermediary can offer only one product and no consumers can buy a product that is
not offered by intermediaries. This single-product dealing can be regarded as a case in which firms
cannot screen consumers. In a retail market, Gabaix and Laibson (2006) consider such a setting in
which each firm can sell only one type of product, and hence no firm can screen between naive and

\(^{38}\) If instead a deceptive product is superior, there exists an equilibrium as the same equilibrium outcome with
Proposition 7 (i) in each of the following cases, and both naive and informed consumers buy deceptive products in
the equilibrium.
sophisticated consumers ex-ante.

In this case, a candidate of a profitable deceptive equilibrium is $p^*_T = v_T$, $f^*_T = v_T - c_T$, $p^*_{D} = c_D - \bar{a} + \frac{N}{1-\sigma}(v_T - c_T)$, $f^*_{D} = \frac{N}{1-\sigma}(v_T - c_T)$. Informed consumers do not buy the product because all intermediaries sell only deceptive products that yield negative ex-post utility. Such a deceptive equilibrium exists if the following modified condition holds:

\[
(v_D - c_D) + \bar{a} \geq \frac{N}{1-\sigma}(v_T - c_T).
\] (5)

Notice that naive consumers’ ex-post utility is $(v_D - c_D) - N(v_T - c_T)/(1-\sigma) < 0$, which is decreasing in the fraction of informed consumers. This is because intermediaries can attract informed consumers as well as naive consumers by promoting non-deceptive products with education. Hence, as $\sigma$ increases, deceptive firms need to give higher commissions to maintain deception. The increase in commissions raises the total product prices and makes naive consumers worse off. This effect might look close to the cross-subsidization effect in Gabaix and Laibson (2006), but here the effect arises even though informed consumers do not buy any product and hence do not get any benefit from the payments of naive consumers. The welfare effect of increasing informed consumers for naive consumers is non-monotonic, and is discontinuous at the threshold value at which Condition (5) holds with equality. Further, conditional on deception, consumer welfare is $(1-\sigma)(v_D - c_D) - N(v_T - c_T)$ and social welfare is $(1-\sigma)(v_D - c_D)$; both are increasing in $\sigma$ if and only if the deceptive product is socially wasteful. Intuitively, since the total amount of commissions to maintain deception in the industry is independent of $\sigma$, only the fraction of consumers who take up deceptive products determines consumer and social welfare. This result implies that educational policies aimed at making consumers sophisticated to the hidden attributes can have a non-monotonic effect on welfare.\(^{39}\)

**Multi-Product Offer**

Next, I analyze the case in which each intermediary can offer multiple products at a time. This multiple-product dealing can be regarded as a menu contract or a multi-product marketing; Heidhues et al. (2012a) analyze such a setting in a retail market. In this case, intermediaries can

\(^{39}\) Kosfeld and Schüwer (2011) investigate a similar welfare effect of increasing sophisticated consumers. In their model, however, welfare losses come from the effort cost of educated consumers to avoid an add-on instead of socially wastefulness of products. See also Grubb (2012) for a perverse welfare effect of disclosing policies when firms screen consumers according to their tastes.
shroud the existence of superior non-deceptive products as well as the hidden attributes of inferior deceptive products in order to screen consumers. Assume that each intermediary can offer as many as products at a time but can promote only one type of product. All non-promoted products are originally shrouded. Naive consumers remain ignorant of non-promoted products, and hence, can buy promoted products only. In contrast, informed consumers can buy any offered product whether the product is promoted or non-promoted. In what follows, I look for a deceptive equilibrium in which all intermediaries promote inferior deceptive products.

First, note that informed consumers buy superior non-deceptive products; otherwise, each intermediary can increase its profits by selling these products without promotion. Then, competition among intermediaries leads informed consumers to buying non-deceptive products at \((p_{TI}^{*}, f_{TI}^{*}) = (c_T, 0)\).

Second, if all intermediaries promote deceptive products without educating consumers, then regarding naive consumers each intermediary faces the same trade-off as in Section 6.1. Hence, the equilibrium outcomes for naive consumers become the same as those in Proposition 7. In this equilibrium, however, there is dual pricing for the non-deceptive product: non-deceptive firms offer two types of contracts, \((p_{T}^{*}, f_{T}^{*}) = (v_T, v_T - c_T)\) and \((p_{TI}^{**}, f_{TI}^{**}) = (c_T, 0)\), to intermediaries. In the deceptive equilibrium, intermediaries are indifferent between promoting deceptive products at \((p_{D}^{*}, v_{D}^{*}) = (c_D - \pi + N(v_D - c_D), N(v_D - c_D))\) without educating consumers, and promoting non-deceptive products at \((p_{TI}^{*}, f_{TI}^{*}) = (v_T, v_T - c_T)\) with educating consumers. Informed consumers buy non-deceptive products, which are shrouded to naive consumers, at \((p_{TI}^{**}, v_{TI}^{**}) = (c_T, 0)\).

**Proposition 8** (Equilibrium under Heterogenous Consumers and Screening). Suppose multiple firms exist for each type of product, a fraction of consumers are informed, \(v_D - c_D \leq v_T - c_T\), and intermediaries can offer multiple products at a time. Then, there exists a deceptive equilibrium in which all intermediaries earn positive profits when Condition (CD) holds. All firms earn zero profits. Naive consumers receive ex-post negative utility from buying promoted deceptive products. Informed consumers receive ex-post positive utility from buying shrouded non-deceptive products. Social welfare is not maximized if \(v_D - c_D < v_T - c_T\).

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If an intermediary promotes both deceptive and transparent products at the same manner, then naive consumers would compare between them and notice the existence of hidden attributes. See Piccione and Spiegler (2012) for a detailed discussion of product comparability. In Section 6.3, I discuss a case where intermediaries promote both types of products without inducing the suspicion of naive consumers.
Intuitively, if naive consumers cannot buy products without the help of experts while informed consumers can find and buy any products, then the market is completely segregated. This result delivers a practical implication: sophisticated and naive consumers buy products at different markets or prices. Indeed, in the mutual-fund industry, some consumers buy index funds through intermediaries with paying more than 1 percent fees, whereas other consumers directly buy funds using the same index with around 0.1 percent fees. Bergstresser, Chalmers and Tufano (2009) find that broker-sold funds attain lower risk-adjusted returns than direct-sold funds do. Hackethal, Haliassos and Jappelli (2012) and Del Guercio and Reuter (2012) also find that consumers who buy products through financial advisors are worse off than those who buy products directly because of commissions and operational costs.

Notice that the equilibrium outcomes would change if intermediaries were not able to shroud non-promoted products to naive consumers. In such a case, if an intermediary unshrouds, then all naive consumers buy the same products as informed consumers buy, i.e., non-deceptive products at \((p_{T_i}^{**}, f_{T_i}^{**}) = (c_T, 0)\). Hence, deceptive firms can undercut other firms by setting \((p_{Di} - \epsilon, f_{Di} - 2\epsilon)\) for small \(\epsilon > 0\) without the threat of unshrouding and promoting non-deceptive products. As a result, competition drives away the profits of intermediaries and leads to \((p_{Di}^{*}, f_{Di}^{*}) = (c_D - \alpha, 0)\) in equilibrium. Notice that, however, the hidden attributes of deceptive products are shrouded and naive consumers still buy inferior deceptive products. This result could help explain, for example, why online search-engine companies such as Orbitz and Expedia sometimes put additional surcharges at non-salient places, although they do not seem to get high commissions from product providers. These considerations, combined with Proposition 8, highlight how the scope of shrouding technologies matters in markets for advice.

6.3 Further Extensions and Modifications

This subsection summarizes further extensions and modifications of the model. I discuss in turn a model incorporating (i) positive costs of educating consumers about hidden attributes, (ii) heterogeneity in consumers’ search intensity, (iii) the possibility of vertical integration, (iv) the possibility that intermediaries can charge advising fees or give perks to consumers directly, and (v) the possibility of promoting multiple products.
Costly Education

To investigate the educational incentive of intermediaries in a clear manner, I have assumed that expert intermediaries can modify consumer misperceptions at no cost. In practice, however, educating consumers can be costly even for experts. In the Supplementary Material, I investigate an extended model in which intermediaries incur cost $\eta \geq 0$ per customer when they choose to educate. I show that if the deceptive equilibrium exists in the original model (i.e., the case $\eta = 0$), then it becomes a unique equilibrium in a model with any positive $\eta$. Intuitively, if some intermediary educates consumers, then other intermediaries have an incentive to free-ride because the education is costly. But then the deceptive firm would give the educating intermediary a high commission to maintain deception, and doing so is always profitable under the parameters where a deceptive equilibrium exists in the case $\eta = 0$.

In the deceptive equilibrium of such an extended model, each intermediary earns commission $N(v_T - c_T - \eta)$ per sale from the deceptive firm. Notice that as education becomes less costly ($\eta$ becomes smaller), intermediaries earn higher commissions from deception. Intermediaries with more expertise earn higher commissions not because they help consumers more, but because the deceptive firm needs to give them higher commissions to maintain deception.

Heterogeneity in Consumers’ Search Intensity

In the model, the number of intermediaries each consumer visits, $N$, is the same across consumers. Here I consider a model incorporating heterogeneity in consumers’ search intensity. Let $(t_1, \cdots, t_J)$ denote the type space of consumers with associated probability distribution $(q_1, \cdots, q_J)$. Suppose consumers with type $t_s$ visit $s$ number of intermediaries randomly. Then, each intermediary has measure $(s/J)q_s$ of type-$t_s$ consumers.

Let $\tilde{N} = \sum_{s=1}^{J} sq_s$. If $q_1 = 0$ and Condition (CD) holds with $N = \tilde{N}$, then there exists a deceptive equilibrium in which intermediaries earn positive profits. This equilibrium outcomes are the same as in Proposition 3. Intuitively, so long as no intermediaries have monopoly power ($q_1 = 0$), then only the expected increase of market share from educating consumers matters in the deceptive equilibrium. If $q_1 > 0$, however, commissions in the non-deceptive equilibrium are also positive because intermediaries have monopoly power in such a case.
Vertical Integration

So far, I have assumed that firms and intermediaries are not vertically integrated. Indeed, all results are robust to allowing various kinds of such possibilities. First, note that if Condition (CD) holds, then the non-deceptive firm cannot vertically integrate with an intermediary profitably. This is because the firm has to pay more than its social surplus to buy out an intermediary. Second, if the non-deceptive firm and some intermediary are vertically integrated or form an exclusive-dealing contract a priori, then the deceptive firm has a strong incentive to buy out such an integrated intermediary. Third, if Condition (CD) holds, then the deceptive firm has an incentive to commit to disallow intermediaries from buying out products and setting prices by themselves. This is because without such a commitment, the market becomes essentially equivalent to retail markets analyzed in Section 4.1, and all profits from deception are competed away. Hence, the deceptive firm does not want intermediaries to set their own product prices. As examples, financial advisors and mortgage brokers are typically not allowed to change product prices (e.g., management fees and interest rates) by themselves.\footnote{In contrast, front-load commissions are sometimes discounted by financial advisors. See the next extension where intermediaries can charge advising fees or give perks to customers directly.}

Going slightly beyond the model, a caveat for deception through intermediation is that a non-deceptive firm has an incentive to train own in-house intermediaries to educate consumers. This practice is essentially equivalent to direct marketing with education. If the cost of developing such in-house intermediaries is small, then consumers would be educated. In some industries, however, this kind of practice is either quite costly or prohibited. For example, doctors cannot sign prescription agreements with any company.

Competition on Advising Fees or Perks

So far, I have assumed that intermediaries cannot charge advising fees or give additional rebates to consumers directly. On the one hand, as described in Inderst and Ottaviani (2012a, 2012b), direct payments for advice are not prevalent in financial services. Moreover, policy regulations sometimes prevent intermediaries from charging direct advising fees or giving perks to their customers. For example, many US states prohibit life-insurance agents to charge broker fees.\footnote{See, for example, California Department of Insurance Bulletin No. 80-6.} On the other hand, intermediaries seem to be able to set direct advising fees in some other industries.

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\footnote{In contrast, front-load commissions are sometimes discounted by financial advisors. See the next extension where intermediaries can charge advising fees or give perks to customers directly.}
Here I discuss how equilibrium outcomes change if intermediaries can charge direct fees or pass their profits to consumers directly. Consider a case in which intermediaries can charge and announce their advising fees to consumers after they choose which product to promote but before consumers visit them. Consumers observe these advising fees (without knowing about product attributes nor prices) and choose \( N \) intermediaries to visit simultaneously.

Suppose first that intermediaries can set only non-negative advising fees. That is, advisors can charge fees for advice but cannot give additional rewards or perks to their customers. In this case, intermediaries compete down their advising fees to zero in order to attract profitable naive consumers. Hence, none of this paper’s results changes.\(^{43}\)

Suppose next that intermediaries can hand out their profits to consumers by setting negative advising fees (i.e., giving perks) upon purchase. In this case, intermediaries pass their profits to consumers through their perks. Although no intermediaries earn positive profits in equilibrium, deception through high commissions still occurs. Intuitively, intermediaries are able to give larger perks by promoting deceptive products than by promoting non-deceptive products because the intermediaries can receive higher commissions financed by deception, and naive consumers only visit intermediaries who give the largest perks. While the profits from deception are handed out to naive consumers, the deceptive firm still pays high commissions to intermediaries and naive consumers may make suboptimal purchase decisions.

As a related issue, in the US mutual-fund industry there are fee-only advisors who do not receive any commission but charge only direct advising fees to customers. Consider a modified model in which a fraction of intermediaries accept no commissions; the remaining fraction of intermediaries receive commissions and maximize profits. For simplicity, assume that such no-commission intermediaries always educate consumers and promote non-deceptive products.\(^ {44}\) Suppose that a deceptive firm cannot buy out such no-commission intermediaries; otherwise, the deceptive firm would verti-

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\(^{43}\) Inderst and Ottaviani (2012c), Armstrong and Vickers (2012), and Grubb (2012) also investigate models with zero price floor. In practice, intermediaries may not be able to set negative advising fees profitably if the negative fees attract not only customers but also “arbitrageurs.” The arbitrageurs are only interested in perks and can avoid any additional fees or hidden bad qualities because they do not use the product itself at all. Heidhues, Kőszegi and Murooka (2012) provide a formal model of arbitrageurs who would take advantage of overly low prices as a micro-foundation for the price floor. This model comes from Ellison’s (2005) insight that firms may not want to set very-low prices because these prices would disproportionately attract less profitable consumers. Furthermore, if intermediaries give perks to consumers, then some of the consumers might become suspicious—they would think there is a catch—and try to understand how firms and intermediaries can make profits from overly low prices.

\(^{44}\) Alternatively, a non-deceptive firm who sells a product through own sales agency with exclusive-dealing contracts can also be regarded as such an intermediary in the model.
ally integrate. Also, suppose that intermediaries cannot set direct advising fees and consumers visit $N$ number of intermediaries randomly; if naive consumers choose which intermediaries to visit based on the level of direct advising fees, then naive consumers have no incentive to visit no-commission intermediaries as discussed in the previous paragraph. In such a model, if a fraction of consumers who reach some no-commission intermediary are small, then profit-maximizing intermediaries still choose to not educate consumers about the hidden attribute. Intuitively, when most consumers are uneducated by no-commission intermediaries, the profit-maximizing intermediaries just earn profits from the remaining uneducated consumers. On the other hand, if a sufficient number of consumers reach some no-commission intermediary, then profit-maximizing intermediaries also choose to educate.

**Multi-Product Promotion**

In the model, I assume that each intermediary can promote only one product. On the one hand, this assumption seems plausible because if an intermediary openly promotes both deceptive and transparent products to everyone, then naive consumers might compare between them and notice the existence of hidden attributes. On the other hand, in some situations intermediaries might be able to promote different types of products without inducing any suspicion of consumers. Here I discuss a modified model where each intermediary can promote both deceptive and transparent products and naive consumers never realize the existence of hidden attributes unless they are educated by some intermediary.

In this case, whether and how educated consumers buy non-deceptive products from deceiving intermediaries becomes a key. If a consumer educated by an intermediary would buy from some other deceiving intermediary when the consumer is indifferent, then the educating intermediary cannot expand its market share by educating consumers about the hidden attribute. Hence, the threat of educating consumers and promoting a transparent product is limited, and the deceptive firm can decrease its commission level without inducing the deviations of intermediaries. In practice, however, educated consumers do not seem to buy products from an intermediary who does not educate them because such a deceiving intermediary loses reputation. To capture this concept in

45 Indeed, in the US mutual-fund industry, the market share of the fee-only advisors is small. There are about 200,000 personal financial advisors in total, whereas members of fee-only personal financial advisors (NAPFA) are about 2,500.
a simple manner, assume that educated consumers discount the value of deceiving intermediaries’ products by \( d \geq 0 \). Then, the equilibrium outcomes in Proposition 3 do not change for any \( d > 0 \). Intuitively, the trade-off between the level of commissions and market share does not change so long as educated consumers buy non-deceptive products from some educating intermediary.

Taking \( d > 0 \) to zero leads to a particular tie-breaking rule: if an educated consumer is indifferent between buying from an educating intermediary and a deceiving intermediary, then the educated consumer buys from the intermediary who educates her. Given this tie-breaking rule, the analysis in the model does not change by allowing the possibility of multi-product promotion.\(^{46}\)

7 Concluding Remarks

This paper analyzes the educational incentives of intermediaries when consumers misperceive product attributes. I show that when firms can give sufficiently high commissions financed by the misperceived attributes, expert intermediaries do not educate consumers even when they are competing for their consumers. Furthermore, if it happens, then having expert intermediaries hurts consumers through the increase in commissions. When there is an appropriate regulation and commissions do not distort the incentives of intermediaries, however, expert intermediaries can work for the consumers.

In what follows, I illustrate several questions raised by, but beyond the scope of, this paper. First, except for an extension in Section 6.3, I focus on the case where expert intermediaries can costlessly modify consumers’ misperceptions. While this assumption is useful to analyze the educational role of intermediaries in a clear manner, costs of education can be non-negligible even when consumers directly consult with experts. Indeed, recent studies report that just providing unbiased information is sometimes not enough to modify consumer misperceptions.\(^{47}\) Studies by

\(^{46}\) A caveat is that the tie-breaking rule is not enough to sustain the equilibrium in Proposition 8. This is because deceptive firms would have an incentive to let uneducating intermediaries promote both (i) deceptive products with a slightly lower price and commission and (ii) non-deceptive products sold at marginal-cost pricing. This is a variant of the case where intermediaries are not able to shroud the existence of non-deceptive products, as mentioned at the last paragraph in Section 6.2. When \( d > 0 \) is sufficiently large, however, all results in Proposition 8 remain the same.

\(^{47}\) Beshears, Choi, Laibson and Madrian (2011) conduct a lab experiment on fund purchase and report that a non-negligible fraction of consumers do not take up the lowest-cost fund even when they receive all relevant information. Choi, Laibson and Madrian (2011) conduct a field experiment in which employees randomly receive either an informational survey explaining about suboptimal choices in their retirement plans or a non-informational survey. The authors find that the change of the employees’ contribution rates in their retirement plans through completing the informational survey is statistically insignificant. Bhattacharya, Hackethal, Kaepler, Loos and Meyer (2012) report that mere availability of unbiased advice is not sufficient for most consumers to make the best decision.
Anagol et al. (2012) and Duarte and Hastings (2012), however, show that consumers sometime (over-)react to provided information. How firms or policymakers can effectively educate naive consumers is an important topic for future research.

Second, consumers may learn about product attributes after incurring hidden costs. They may also learn from neighbors about hidden attributes. It seems that, however, merely having the opportunity of repeated sales may not be enough to eliminate deception in an emerging market. Moreover, if a sufficient number of new consumers enter the market in each period, then deception would be sustained in every period to exploit these new consumers. A general analysis of learning and market dynamics under consumer naivete is an interesting topic.

Finally, consumers’ search intensity, $N$, is exogenously given in this paper. All results would remain the same if consumers’ visiting costs are zero for first $N$ intermediaries and are positive after visiting $N$ intermediaries. If instead consumers incur a positive cost per visit, then all consumers would visit only one intermediary as shown in Diamond (1971). Developing a tractable consumer-search model under naivete, as well as investigating why and how naive consumers search for advice in financial markets, is left for future research.

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48 To see it, suppose the market described in Section 3 is repeated twice and no party enters in the second period. Assume that after the first period, all consumers become informed due to some exogenous learning force. In this case, competition among intermediaries drives down commissions to zero in the second period. Given this, the trade-off between the level of commissions and market share in the first period does not change, and the deceptive equilibrium exists in the first period if Condition (CD) holds.

49 In a sequential consumer-search model, it is often assumed that a fraction of consumers can visit multiple shops at no cost. See, for example, Stahl (1989).
Appendix: Proofs

Proof of Proposition 1. In the main text. □

Proof of Proposition 2.

Suppose first \( v_D - c_D \leq 0 \). In this case, informed consumers never buy product \( D \). In the equilibrium, \( p_{T_i}^* = v_T, f_{T_i}^* = 0 \) for all \( i \), and all consumers buy product \( T \).

Suppose next \( v_D - c_D > 0 \). Consider the case \( v_D - c_D \geq v_T - c_T \); the case \( 0 < v_D - c_D < v_T - c_T \) can be shown by the same logic. I first show that firm \( D \)'s equilibrium profits are equal to the difference of social surplus of the products: \( p_{Di}^* + \pi - f_{Di}^* - c_D = (v_D - c_D) - (v_T - c_T) \). Note that firm \( T \) never sets its price below its total cost by the assumption: \( p_{Ti}^* \geq c_T + f_{Ti}^* \). If \( v_D - p_{Di} - \pi > v_T - p_{Ti} \) and \( f_{Di} > f_{Ti} \), then intermediary \( i \) never sells product \( T \). Hence, if firm \( D \) earns profits less than \( (v_D - c_D) - (v_T - c_T) \) or if an intermediary \( i \) sells product \( T \) and has positive market share, then firm \( D \) can make intermediary \( i \) promote product \( D \) by setting \( p'_{Di} = p_{Ti}^* - \pi + v_D - v_T - \epsilon, f'_{Di} = f_{Ti}^* + \epsilon \) for sufficiently small \( \epsilon > 0 \), and this ensures firm \( D \)'s profits \((v_D - c_D) - (v_T - c_T) - 2\epsilon \). By the same logic, the equilibrium profits of firm \( D \) is at most \((v_D - c_D) - (v_T - c_T)\); otherwise firm \( T \) would make intermediaries promote product \( T \) by setting \( p'_{Ti} = v_T - v_D + p_{Di}^* + \pi - \epsilon, f'_{Ti} = f_{Di}^* + \epsilon \) for sufficiently small \( \epsilon > 0 \).

Now I show that \( f'_{Di} = 0 \) and hence \( p'_{Di} = v_D - (v_T - c_T) - \pi \) for any intermediary \( i \) with positive market share. Suppose otherwise. Then, by the previous paragraph, \( f'_{Di} = p_{Di}^* - \{v_D - (v_T - c_T) - \pi\} > 0 \) for any \( i \) with positive market share. First, suppose some intermediary \( j \) earns zero profits. Then, firm \( T \) can profitably deviate by proposing a contract \( p'_{Tj} = c_T + (1 - \epsilon)f_{Di}^* \), \( f'_{Tj} = (1 - 2\epsilon)f_{Di}^* \) to such \( j \) with sufficiently small \( \epsilon > 0 \). Next, suppose all intermediaries earn positive profits by promoting product \( D \). Then, firm \( D \) must propose its highest product price to multiple intermediaries; otherwise, firm \( D \) can profitably increase its second-highest price offered to intermediaries without inducing intermediaries' deviations. Let \( h \) be one of such intermediaries. Take firm \( T \)'s alternative contract to intermediary \( h \) such that \( p'_{Th} = c_T + (1 - \epsilon)f_{Dh}^*, f'_{Th} = (1 - 2\epsilon)f_{Dh}^* \). For sufficiently small \( \epsilon > 0 \), intermediary \( h \) would promote product \( T \)—a contradiction. □

Proof of Proposition 3.

Note that if all consumers are educated about \( \pi \), then no intermediary earns positive profits and social welfare is maximized as in Proposition 2. Also, the condition for the existence of the
equilibria in which all intermediaries promote product \( D \) without educating consumers is shown in the main text.

In what follows, I prove that if some consumers are uneducated about \( \bar{a} \), then all intermediaries promote product \( D \) and all consumers are uneducated about \( \bar{a} \). This leads to the uniqueness of the outcome among deceptive equilibria.\(^{50}\) Suppose otherwise. Note that in this case, at least \( N \) number of intermediaries do not educate consumers about \( \bar{a} \) on the equilibrium path. The proof has eight steps.

(i): *Each intermediary is indifferent between promoting product \( D \) and promoting product \( T \).* Suppose some intermediary strictly prefers to promote some product. Note that the intermediary must earn positive profits. Then, a firm providing that product can profitably decrease a commission to the intermediary by a bit—a contradiction.

(ii): *Some intermediary earns positive profits.* Suppose all intermediaries earn zero profits. Since at least \( N \) intermediaries do not educate consumers about \( \bar{a} \), some non-educating intermediary has positive market share.

First, consider a case in which some consumers buy product \( D \). Then, there exists intermediary \( i \) who promotes product \( D \) and has positive market share. If \( p_{Di}^* > v_D - (v_T - c_T) - \bar{a} \) for some of such \( i \), then firm \( T \) can offer \( p_{Ti}^* = p_{Di}^* + v_T - v_D + \bar{a} \), \( f_{Ti}^* = \epsilon \) for sufficiently small \( \epsilon > 0 \), let \( i \) educate consumers and promote product \( T \), and increase its profits. Hence, all consumers buying product \( D \) on the equilibrium path pay \( p_{Di}^* \leq v_D - (v_T - c_T) - \bar{a} \). Then, firm \( D \) can propose \( p_{Di}^* = v_D - (v_T - c_T) - \bar{a} + 2\epsilon \), \( f_{Di}^* = \epsilon \) to every intermediary who either promotes product \( D \) or does not educate consumers (or both) on the equilibrium path. Because at least \( N \) intermediaries do not educate consumers on the equilibrium path, all such intermediaries can earn positive profits by not educating consumers and promoting product \( D \) with the new contract. Also, for sufficiently small \( \epsilon > 0 \), no intermediary can profitably promote product \( T \). Hence, firm \( D \) can profitably deviate—a contradiction.

Second, consider a case in which all consumers buy product \( T \). If \( p_{Ti}^* < v_T - \max\{0, v_D - c_D\} \) for some \( i \) with positive market share, then firm \( T \) can propose \( p_{Ti}^* = p_{Ti}^* + 2\epsilon \), \( f_{Ti}^* = \epsilon \) for sufficiently small \( \epsilon > 0 \), let \( i \) educate consumers and promote product \( T \), and increase its profits. Hence, any

\(^{50}\) This uniqueness result relies on an equilibrium refinement: given other intermediaries’ strategies, if an intermediary chooses to educate (resp. not educate) on the equilibrium path, then the intermediary keeps choosing to educate (resp. not educate) in any other subgame whenever doing so is a best response. Without this refinement, other deceptive-equilibrium outcomes can exist due to the coordination problems of intermediaries’ educational decisions.
intermediary \( i \) with positive market share promotes product \( T \) with \( p^*_T \geq v_T - \max\{0, v_D - c_D\} \).
Consider that firm \( D \) offers \( p'_{Di} = v_D - \epsilon, f'_{Di} = \epsilon \) to all intermediaries when \( v_D - c_D \leq 0 \) and offers \( p''_{Di} = p^*_T + v_D - v_T - \bar{a} + 2\epsilon, f''_{Di} = \epsilon \) to all intermediaries when \( v_D - c_D > 0 \). Because at least \( N \) intermediaries do not educate consumers on the equilibrium path, in either case each intermediary can earn positive profits by not educating consumers and promoting product \( D \) with the new contract. Also, for sufficiently small \( \epsilon > 0 \), no intermediary can profitably promote product \( T \). Hence, firm \( D \) can increase its profits—a contradiction.

(iii): Some intermediary promotes product \( D \). Suppose all intermediaries promote product \( T \). By (ii), there exists intermediary \( i \) who earns positive profits. By (i), intermediary \( i \) is indifferent between promoting product \( T \) and product \( D \), and hence, intermediary \( i \) can earn positive profits by promoting product \( D \) with a contract \( (p^*_D, f^*_Di) \). It leads that \( f^*_Di > 0 \).

First, consider a case in which intermediary \( i \) would split its market share with some other intermediary if \( i \) promotes product \( D \) with a contract \( (p^*_Di, f^*_Di) \). In this case, firm \( D \) can offer \( p_{Di}' = p^*_Di - \epsilon, f_{Di}' = f^*_Di - 2\epsilon \) for sufficiently small \( \epsilon > 0 \), let \( i \) promote product \( D \), and increase its profits—a contradiction.

Second, consider a case in which intermediary \( i \) would not split its market share with any other intermediary if \( i \) promotes product \( D \) with a contract \( (p^*_Di, f^*_Di) \). Note that \( p^*_Di < v_D \) must hold in this case; otherwise, only intermediary \( i \) has positive market share in the equilibrium, and firm \( D \) can profitably deviate by offering \( p_{Dj}' = v_D - \epsilon, f_{Dj}' = f^*_Di - 2\epsilon \) to any intermediary \( j \neq i \). But if \( p^*_Di < v_D \), then firm \( D \) can offer \( p_{Di}' = p^*_Di + 2\epsilon, f_{Di}' = f^*_Di + \epsilon \) for sufficiently small \( \epsilon > 0 \), let \( i \) promote product \( D \), and earn positive profits—a contradiction.

(iv): All consumers buy product \( D \). Suppose some consumers buy product \( T \). Let \( \Sigma \) be the set of intermediaries who promote product \( T \) and have the lowest product price of product \( T \) among those who promote product \( T \). By (i), any \( s \in \Sigma \) is indifferent between promoting product \( D \) and promoting product \( T \).

First, suppose a case in which \( f^*_Ts = 0 \) for all \( s \in \Sigma \). If \( p^*_Ts < v_T - \max\{0, v_D - c_D\} \) for some \( s \in \Sigma \), then firm \( T \) can propose \( p'_{Ts} = p^*_Ts + 2\epsilon, f'_{Ts} = \epsilon \) for sufficiently small \( \epsilon > 0 \), let \( s \) educate consumers and promote product \( T \), and increase its profits. If \( p^*_Ts \geq v_T - \max\{0, v_D - c_D\} \) for all \( s \in \Sigma \), then firm \( D \) can offer \( p'_{Ds} = p^*_Ts + v_D - v_T - \bar{a} + 2\epsilon, f'_{Ds} = \epsilon \) for small \( \epsilon > 0 \) to all such \( s \in \Sigma \). Because each \( s \in \Sigma \) can earn positive profits by promoting product \( D \), this is a profitable
deviation for firm $D$.

Second, suppose a case in which $f_{Ts}^* > 0$ for some $s \in \Sigma$. By (iii), some other intermediary promotes product $D$. Then, a fraction of consumers are indifferent between buying product $T$ from $s$ and buying product $D$ from some other intermediary on the equilibrium path; otherwise, firm $T$ can profitably deviate by offering $p_{Ts}^t = p_{Ts}^* + 2\epsilon, f_{Ts}^t = f_{Ts}^* + \epsilon$ to all $s \in \Sigma$ when $p_{Ts}^* < v_T$, and firm $D$ can profitably deviate by offering $p_{Ds}^t = v_D - \epsilon, f_{Ds}^t = f_{Ds}^* - 2\epsilon$ to some $s \in \Sigma$ with $f_{Ts}^* > 0$ when $p_{Ts}^* = v_T$. But then, firm $T$ can profitably deviate by offering $p_{Ts}^t = p_{Ts}^* - \epsilon, f_{Ts}^t = \max\{0, f_{Ts}^* - (N + 1)\epsilon\}$ to all $s \in \Sigma$ for sufficiently small $\epsilon > 0$—a contradiction.

(v): All intermediaries earn positive profits. Suppose intermediary $i$ earns zero profits. By (ii), let $h \neq i$ be an intermediary who earns positive profits. By (i), $h$ is indifferent between promoting product $D$ and promoting product $T$, and hence $h$ can earn positive profits by promoting product $T$. Note that firm $T$ earns zero profits by (iv). When firm $T$ offers $p_{Ti}^t = p_{Th}^t, f_{Ti}^t = f_{Th}^t/2$ to intermediary $i$, then $i$ can earn positive profits by educating consumers and promoting product $T$. Hence, firm $T$ can profitably deviate—a contradiction.

(vi): All intermediaries promote product $D$. Notice that by (v), all intermediaries have positive market share on the equilibrium path. Since no consumers buy product $T$ on the equilibrium path by (iv), all intermediaries promote product $D$.

(vii): For any two contracts associated with different products, consumers are never indifferent after education. Suppose otherwise: there exist contracts $(p_{Di}^*, f_{Di}^*)$ and $(p_{Tj}^*, f_{Tj}^*)$ such that $v_D - p_{Di}^* = v_T - p_{Tj}^* + \alpha$. By (i) and (v), both firms set positive commissions to all intermediaries. By (vi), intermediary $i$ promotes product $D$. Consider firm $T$’s offer $p_{Tj}^t = p_{Tj}^* - \epsilon, f_{Tj}^t = f_{Tj}^* - 2\epsilon$. Then, intermediary $j$ would promote product $T$ and firm $T$ earns positive profits—a contradiction.

(viii): No intermediary educates consumers. I first show that $p_{Ti}^* = v_T$ for all $i$. Suppose otherwise. Then by (vii), firm $T$ can offer $p_{Ti}^t = p_{Ti}^* + 2\epsilon, f_{Ti}^t = f_{Ti}^* + \epsilon$ and let $i$ promote product $T$ with educating consumers—a contradiction. Furthermore, if $p_{Ti}^* = v_T$ for all $i$ and $p_{Dj}^* < v_D$ for some $j$, then firm $D$ can profitably increase its price offered to intermediary $j$ by a bit. Hence, $p_{Di}^* = v_D$ for all $i$. Note that no intermediary can sell product $D$ once consumers are educated about $\alpha$. Since each intermediary earns positive profits by promoting product $D$, all intermediaries choose to not educate consumers about $\alpha$. 

\[ \square \]

**Proof of Proposition 4.**
The case in which intermediaries can educate consumers is analyzed in Proposition 3. When no party can educate consumers about $\bar{a}$, firms and intermediaries compete as in Proposition 2 except that consumers do not take $\bar{a}$ into account in their purchase decisions. Hence, when Condition (CD) holds, all consumers buy product $D$ with a price $p^*_D = v_D - (v_T - c_T)$, firm $T$ and all intermediaries earn zero profits, and firm $D$ earns profits $v_D - c_D - (v_T - c_T) + \bar{a}$.

Proof of Proposition 5.

The case of multiple intermediaries is analyzed in Proposition 3. Consider a model in which all consumers visit only one intermediary. If Condition (CD) holds, then in any equilibrium the intermediary promotes product $D$; otherwise, firm $D$ can propose $p'_D = v_D - \epsilon$, $f'_D = (v_T - c_T) + \epsilon$ and let the intermediary promote product $D$. Also, firm $D$ sets $p'_D = v_D$ because otherwise firm $D$ can profitably increase its product price by $2\epsilon$ and its commission by $\epsilon$. Hence, the ex-post utility of consumers under a monopoly intermediary is $-\bar{a}$.

Proof of Proposition 6.

I show that if commissions are regulated to $f_{xi} < N(v_T - c_T)$ for all $x$ and $i$, then all consumers are educated in any equilibrium. I prove it by contradiction. Suppose there exists an equilibrium in which some consumers are not educated about $\bar{a}$. Even under the commission regulation, the proof of Proposition 3 still holds up to the end of (vii). Also, if some intermediary $i$ promotes product $D$, then $p^*_D = v_D$ and $p^*_T = v_T$ by (viii). Given this, all intermediaries promoting product $D$ choose to not educate consumers. But because of the regulation, some intermediary would deviate to educate consumers. Hence, in any equilibrium there exist a fraction of consumers who visit one educating intermediary and $N-1$ non-educating intermediaries. Since all intermediaries promoting product $T$ educate consumers, each non-educating intermediary can attract consumers who only visit intermediaries promoting product $D$. However, firm $T$ can offer $p'_{Ti} = v_T$, $f'_{Ti} = v_T - c_T - \epsilon$ to non-educating intermediary $i$, let $i$ promote product $T$, and increase its profits for sufficiently small $\epsilon > 0$—a contradiction.

Proof of Corollary 1.

(i): Note that under the deceptive equilibrium in Proposition 3, all intermediaries do not educate consumers about $\bar{a}$ and all consumers buy product $D$. Hence, firm $D$ pays the innovation cost if and only if $I_a \leq \Delta a$. 40
(ii): Immediate from Proposition 6.

Proof of Proposition 7.

(i): First of all, in any equilibrium all firms earn zero profits; otherwise some firm could increase its profits by raising its commissions by a bit. Also, because \( v_D - c_D > v_T - c_T \) all consumers buy product \( D \) on the equilibrium path; otherwise some type-\( D \) firm can induce intermediaries promoting product \( T \) to deviate and increase its profits.

In what follows, I show that no intermediary earns positive profits. Suppose otherwise. First, consider a case where intermediary \( i \) is indifferent between promoting product \( D \) and promoting product \( T \) with commission \( f_{T_i}^* > 0 \). Since \( v_D - c_D > v_T - c_T \), then some type-\( D \) firm can let intermediary \( i \) deviate and make positive profits by offering \( p_{D_i}' = v_D - (v_T - c_T) - \bar{a} + f_{T_i}^* \), \( f_{D_i}' = f_{T_i}^* + \epsilon \) for sufficiently small \( \epsilon > 0 \)—a contradiction. Next, consider a case where intermediary \( i \) strictly prefers to promote product \( D \). But then, a deceptive firm can profitably deviate by offering \( p_{D_i}' = p_{D_i}^* - \epsilon, f_{D_i}' = f_{D_i}^* - 2\epsilon \) to intermediary \( i \) for sufficiently small \( \epsilon > 0 \)—a contradiction. Therefore, no intermediary earns positive profits if \( v_D - c_D > v_T - c_T \). Since all profits—including the profits from the hidden attributes—are passed back to consumers and \( v_D - c_D > v_T - c_T \), in any equilibrium consumers get ex-post positive utility and social welfare is maximized.

(ii): In the main text.

Proof of Proposition 8.

In the main text.
References


Supplementary Material for “Deception under Competitive Intermediation” by Takeshi Murooka (not intended for publication)

In Section A, I examine variants of benchmark models presented in the main draft. In Section B, I investigate an extended model in which intermediaries incur positive costs for educating consumers.

A Further Benchmark Cases

This section investigates variants of benchmark models presented in the main draft.

Equilibrium When Intermediaries Are Not Necessary: Further Cases

Here I present the robustness of the benchmark result summarized in Proposition 1 about the specifications of timing between pricing and educating decisions. Notice that in each of the following models, there always exists a non-deceptive equilibrium in which firm \( T \) always educates consumers, a firm with lower social surplus sets its total price equal to marginal cost, and intermediaries earn zero profits.

First, consider a model in which firms first choose own prices, and after observing the prices the firms simultaneously choose whether to educate consumers. Suppose there exists an equilibrium path where consumers are not educated. Since firms are facing Bertrand-type price competition, in equilibrium each consumer is indifferent between buying product \( D \) and \( T \) without taking \( \bar{a} \) into account: \( v_D - p^*_D = v_T - p^*_T \). If firm \( D \) has positive market share, then firm \( T \) can always increase its profits by educating consumers. If firm \( D \) has zero market share, then firm \( T \) can still attract all consumers by charging a price \( p'_{T} = p^*_T + \bar{a}/2 \) in the first stage and educating consumers in the second stage. Hence, all consumers are educated in equilibrium:

**Proposition A.1** (Equilibrium When Intermediaries Are Not Necessary, Pricing-then-Education). Suppose firms directly market to consumers, choose their prices first, and then decide whether to educate consumers after observing the prices. Then, all consumers are educated in any equilibrium.

Next, consider a model in which firms first choose whether to educate consumers, and after observing the decisions the firms simultaneously set own prices. I show that if the deceptive
product is socially inferior to the transparent product (i.e., $v_D - c_D < v_T - c_T$), then all consumers are educated.\footnote{Here, a deceptive equilibrium can exist when $v_D - c_D \geq v_T - c_T$. This is because firm $T$ cannot profitably sell its product even after education, and hence firm $T$ has no incentive to educate consumers. In this case, however, social welfare is maximized because the deceptive product is socially superior to the transparent one.} To see it, notice that $p_D^* = c_D - \bar{a}$, $p_T^* = \min\{v_T, v_T - (v_D - c_D)\}$ holds in any second-stage subgame when consumers are educated. Also, by the same logic as Proposition 1, either $p_D^* = c_D - \bar{a}$, $p_T^* = v_T - (v_D - c_D) - \bar{a}$ or $p_D^* = v_D - (v_T - c_T)$, $p_T^* = c_T$ holds in any second-stage subgame when consumers are uneducated. Hence, if consumers are uneducated on the equilibrium path, then in either case firm $T$ can increase its profits by educating consumers in the first stage—a contradiction. Dahremöller (2013) shows a similar result in a market with horizontally-differentiated products.

**Proposition A.2** (Equilibrium When Intermediaries Are Not Necessary, Education-then-Pricing).

Suppose firms directly market to consumers, decide whether to educate consumers first, and then choose prices after observing the educational decisions. If the deceptive product is socially inferior to the transparent product, then all consumers are educated in any equilibrium.

**Equilibrium without Naivete: Further Case**

In this subsection, I show that the result in Proposition 2 remains the same if consumers correctly anticipate the existence of a hidden attribute but do not know which product has the hidden attribute. The following result is a variant of Ellison’s (2005) Proposition 4 or of Gabaix and Laibson’s (2006) benchmark case where consumers are Bayesian.

Consider a case in which all consumers correctly anticipate that one firm has a hidden fee $\bar{a} > 0$, but the consumers cannot observe which firm has the hidden fee. To make a model well-defined, let $q \in (0, 1)$ be the consumers’ ex-ante prior belief where firm $D$ has the hidden fee, although the following proof and results do not depend on $q$. As in standard asymmetric-information models, assume that each consumer forms an ex-post belief based on Bayesian inference.

Suppose, toward to a contradiction, that there exists an equilibrium in which some consumers remain uneducated. Then, there must exist an intermediary who has positive market share and does not educate consumers on the equilibrium path. Let $i$ be such an intermediary and $x$ be the product intermediary $i$ promotes. Notice that uneducated consumers must form a rational belief. First, suppose a case in which uneducated consumers’ belief is that intermediary $i$ promotes
product $x$ only when product $y \neq x$ has the hidden fee. Then, firm $x$ would let $i$ promote product $x$ and not educate consumers when (in terms of consumers’ ex-ante perspective) product $x$ has the hidden fee—a contradiction. Second, suppose a case in which uneducated consumers’ belief is that intermediary $i$ promotes product $x$ in any case. Then, firm $x$ would let $i$ educate consumers when (in terms of consumers’ ex-ante perspective) product $x$ does not have the hidden fee, because the education would increase consumers’ willingness to pay—a contradiction. Given this, consumers must form a belief such that intermediary $i$ promotes product $x$ only when product $x$ has the hidden fee. Hence, uneducated consumers always correctly foresee which product has the hidden fee for sure. Then, standard Bertrand-competition arguments apply. The next proposition summarizes the result:

**Proposition A.3** (Equilibrium without Naivete: Anticipated Consumers). Suppose firms market through intermediaries and all consumers correctly anticipate the existence of $\sigma$ but do not know which firm has $\sigma$. Then, in any equilibrium, all consumers correctly foresee which product has $\sigma$, and all intermediaries earn zero profits.

Intuitively, when consumers correctly anticipate the existence of a hidden attribute, education increases consumers’ willingness to pay for a non-deceptive product, and hence the non-deceptive firm always induces intermediaries to educate consumers. Therefore, consumers correctly foresee that uneducating intermediaries always promote a deceptive product.

## B Costly Education

In the main text, I have assumed that intermediaries can educate consumers about hidden attributes at no cost. Although this setting allows me to investigate the educational incentive of intermediaries in a clear manner, in practice educating consumers can be costly even for expert intermediaries. This section investigates an extended model in which each intermediary incurs cost $\eta \geq 0$ per consumer when it chooses to educate the consumer. Each intermediary incurs no cost if it does not educate consumers. I show that if Condition (CD) holds in the original model—equivalent to a case $\eta = 0$—then in a model with $\eta > 0$ the equilibrium becomes unique and is fully deceptive, i.e., all intermediaries promote the deceptive product and all consumers are uneducated.

To see the intuition, I first consider the case $N = J$. In this case, at most one intermediary
educates consumers in any subgame because other intermediaries have an incentive to free-ride and avoid the education cost. But then the deceptive firm would give the educating intermediary a sufficiently high commission to employ deception \((p'_{Di} = v_D - v_T + p^*_T, f'_{Di} = N(v_T - c_T) - \epsilon\) for small \(\epsilon > 0\)), and it is always a profitable deviation given Condition (CD).

Now I prove the case \(N > J\). It is straightforward to show that the fully deceptive equilibrium exists in which \(p^*_{Di} = v_T, f^*_{Di} = N(v_T - c_T - \eta), p^*_T = v_T, f^*_T = v_T - c_T\), all intermediaries promote product \(D\) and do not educate consumers, and all consumers buy it. The proof in which there is no partial education—some consumers are educated while others are uneducated—is essentially the same as in the proof of Proposition 3.

In what follows, I show that there is no equilibrium in which all consumers are educated. Suppose otherwise. Notice that in such a non-deceptive equilibrium, all intermediaries earn zero net profits (profits after subtracting education costs); otherwise, a firm with positive market share would profitably undercut its prices and commissions.

In any of such equilibria, the number of intermediaries who educate consumers in any subgame is at most \(J - (N-1)\); if more than \(J - (N-1)\) intermediaries educate consumers, then all consumers are educated even when one educating intermediary does not educate, and hence some educating intermediary would profitably deviate. Also, since all consumers are educated, the number of educating intermediaries must be equal to \(J - (N-1)\). Notice that all educating intermediaries must earn positive gross profits (profits before subtracting education costs) because they incur education costs. Also, intermediaries promoting product \(D\) strictly prefer to not educate consumers in any subgame, and hence all educating intermediaries must promote product \(T\). Then, each educating intermediary has smaller market share if it does not educate; otherwise, the intermediary would profitably deviate by promoting product \(T\) without education. It implies that there exist intermediaries who promote product \(D\) without education, and all of them would have positive market share if one educating intermediaries deviates to not educate. Also, these non-educating intermediaries earn zero profits when all consumers are educated (i.e., on the equilibrium path); otherwise, educated consumers are indifferent of between buying product \(D\) from the non-educating intermediaries and buying product \(T\) from educating intermediaries, and firm \(D\) would undercut its prices. Now, take an educating intermediary \(i\) who earns zero net profits. Then, firm \(D\) can offer \(p'_{Di} = v_D - v_T + p^*_T, f'_{Di} = N(v_T - c_T) - \epsilon\) for sufficiently small \(\epsilon > 0\). By doing so, firm
$D$ can always increase its profits by offering such an alternative contract because intermediary $i$ earns positive net profits by promoting product $D$ without education and Condition (CD) holds in the original model. Therefore, this is a profitable deviation from the non-deceptive equilibrium—a contradiction.

**Proposition B.1** (Uniqueness in a model with costly education). Fix all parameters other than $\eta \geq 0$, and suppose that a deceptive equilibrium exists when $\eta = 0$. Then, for any $\eta > 0$ there exists a unique equilibrium in which $p_{Di}^* = v_T$, $f_{Di}^* = N(v_T - c_T - \eta)$, $p_{Ti}^* = v_T$, $f_{Ti}^* = v_T - c_T$, all intermediaries promote product $D$ and do not educate consumers, and all consumers buy it.

It is worth mentioning that intermediaries earn higher commissions from deception as consumers become easier to be educated (i.e., $\eta$ becomes smaller). Intermediaries with more expertise earn higher commissions not because they help consumers more, but because the deceptive firm needs to give them higher commissions in order to maintain deception.