Persuasion: Empirical Evidence

Stefano DellaVigna[1] and Matthew Gentzkow[2]

[1]Department of Economics, University of California, Berkeley, California 94720, and NBER; email: sdellavi@berkeley.edu

[2]Graduate School of Business, University of Chicago, Chicago, Illinois 60637, and NBER; email: gentzkow@chicagobooth.edu

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Abstract

We provide a selective survey of empirical evidence on the effects as well as the drivers of persuasive communication. We consider persuasion directed at consumers, voters, donors, and investors. We organize our review around four questions. First, to what extent does persuasion affect the behavior of each of these groups? Second, what models best capture the response to persuasive communication? Third, what are persuaders' incentives, and what limits their ability to distort communications? Finally, what evidence exists on the way persuasion affects equilibrium outcomes in economics and politics?

1. INTRODUCTION

The efficiency of market economies and democratic political systems depends on the accuracy of individuals' beliefs. Consumers need to know the set of goods available and be able to evaluate their characteristics. Voters must understand the implications of alternative policies and be able to judge the likely behavior of candidates once in office. Investors should be able to assess the expected profitability of firms.

Some beliefs are shaped by direct observation. But a large share of the information on which economic and political decisions are based is provided by agents who themselves have an interest in the outcome. Information about products is delivered through advertising by the sellers, political information comes from candidates interested in winning elections, and financial data are released strategically to shape the perceptions of investors. Third parties that might be more objective—certifiers, media firms, financial analysts—have complex incentives that may diverge from the interests of receivers.

Scholars have long theorized about the implications of communication by motivated agents. Some have seen persuasion as a largely negative force, with citizens and consumers easily manipulated by those who hold political or economic power (Lippmann 1922, Robinson 1933, Galbraith 1967). Others have been more positive, seeing even motivated communications as a form of information that can ultimately increase efficiency (Bernays & Miller 1928, Downs 1957, Stigler 1961).

In this review, we provide a selective survey of empirical evidence on the effects as well as the drivers of persuasive communication. We define a persuasive communication to be a message provided by one agent (a sender) with at least a potential interest in changing the behavior of another agent (a receiver). We exclude situations in which an agent attempts to manipulate another through means other than messages—providing monetary incentives, for example, or outright coercion. We also depart from some existing literatures in using the term persuasion to refer to both informative and noninformative dimensions of messages.

Some of the evidence we review comes from economists, including a recent surge of work applying modern empirical tools. Other evidence comes from marketing, political science, psychology, communications, accounting, and related fields. Our main focus is on studies that credibly identify effects on field outcomes. We do not attempt to review the laboratory evidence on persuasion. Even within these parameters, we inevitably omit many important studies and give only cursory treatment to others.

We consider four groups that are targets of persuasion: consumers, voters, donors, and investors. We organize our review around four questions. First, to what extent does persuasion affect the behavior of each of these groups? Second, what models best capture the response to persuasive communication? In particular, we distinguish belief-based models from preference-based models. Third, what are persuaders' incentives, and what limits their ability to distort communications? Finally, what evidence exists on the equilibrium outcomes of persuasion in economics and politics?

2. HOW EFFECTIVE IS PERSUASION?

A large portion of the literature on persuasion is concerned with measuring the effect of persuasive communications on behavior. Credibly measuring the direct effect of persuasion is interesting in its own right, and it is also an input to better understand when and where persuasion is effective, what models best explain receivers' reactions, and so on.

The estimates of the effectiveness of persuasion, however, are hard to compare. The studies on persuasion adopt a variety of empirical methodologies—natural experiments, field experiments, and structural estimates, among others—and outcome variables, in settings as diverse as advertising campaigns and analyst recommendations.

In this section, we provide a unified summary of some of the best existing evidence across the different areas mentioned above. Whenever possible, we report the results in terms of the persuasion rate (DellaVigna & Kaplan 2007), which estimates the percentage of receivers that change the behavior among those that receive a message and are not already persuaded. We summarize persuasion rates for the studies we review in **Table 1**. [The **Supplemental Appendix** details the calculation of the persuasion rate for each study (follow the Supplemental Material link from the Annual Reviews home page at **http://www.annualreviews.org**).]

In a setting with a binary behavioral outcome, a treatment group *T*, and a control group *C*, the persuasion rate *f* (in percent terms) is

$$f = 100 \times \frac{y_T - y_C}{e_T - e_C} \frac{1}{1 - y_0}, \tag{1}$$

where e_i is the share of group *i* receiving the message, y_i is the share of group *i* adopting the behavior of interest, and y_0 is the share that would adopt if there were no message. Where y_0 is not observed, we approximate it by y_C.[1]

The persuasion rate captures the effect of the persuasion treatment on the relevant behavior ($y_T - y_C$), adjusting for exposure to the message ($e_T - e_C$) and for the size of the population left to be convinced ($1 - y_0$). For example, suppose that get-out-the-vote (GOTV) mailers sent to the treatment group increase turnout by 1 percentage point relative to the control group. The size of this effect may suggest that mailers are not very persuasive. However, the implied persuasion rate can in reality be high if, say, only 10% of voters in the treatment group received a GOTV mailer ($e_T - e_C$ is small) and the targeted population already had high turnout rates of 80% ($1 - y_0$ is small). In this case, the implied persuasion rate is $f = 100 \times (0.01)/(0.1 \times 0.2) = 50\%$. If the persuadable population is small, a small change in behavior can imply a high impact of persuasion.

We do not claim that the persuasion rate is a deep parameter that will be constant either within or between contexts. It captures the average rather than the marginal effect of persuasion and will depend, for example, on the quality of messages, the incentives of senders, the prior beliefs of receivers, and the heterogeneity in the population. Nevertheless, the normalization in Equation 1 puts studies on more equal footing and makes it easier to isolate the role of determinants of persuasive effects.

2.1. Persuading Consumers

The first form of persuasion we consider is communication directed at consumers. Most studies in this domain focus on communication from firms in the form of advertising. The behavioral outcome is typically purchases or sales volume.

Some of the earliest studies of advertising effects exploit messages that can be linked directly to receiver responses. Shryer (1912), for example, places classified ads for a mail-

[1]Assuming random exposure and a constant persuasion rate *f*, the share in group *i* who adopt the behavior is $y_i = y_0 + e_i f(1 - y_0)$. Rearranging this expression gives Equation 1. Solving the system for y_0, one obtains $y_0 = y_C - e_C (y_T - y_C)(e_T - e_C)$. The approximation $y_0 = y_C$ is valid as long as the exposure rate in the control group is small ($e_C \approx 0$) or the effect of the treatment is small ($y_T - y_C \approx 0$).

Table 1 Persuasion rates: summary of studies

Paper	Treatment (1)	Control (2)	Context (3)	Variable t (4)	Year (5)	Recipients (6)	Time horizon (7)	Sample size (8)	Treatment group t_T (9)	Control group t_C (10)	Exposure rate e_T–e_C (11)	Persuasion rate f (12)
Persuading consumers												
Simester et al. 2007 (NE)	17 clothing catalogs sent	12 catalogs	Women's clothing	Share purchasing ≥1 item	2002	Infrequent customers	1 year	N = 10,000	36.7%	33.9%	100%*	4.2%
						Frequent customers		N = 10,000	69.1%	66.8%	100%*	6.9%
Bertrand et al. 2010 (FE)	Mailer with female photo	Mailer no photo	Loan offer in South Africa	Applied for loan	2003	Previous clients of bank	1 month	N = 53,194	9.1%	8.5%	100%*	0.7%
	Mailer with 4.5% interest rate	Mailer with 6.5% interest rate							9.1%	8.5%	100%*	0.7%
Persuading voters												
Gosnell 1926	Card reminding of registration	No card	Presidential election	Registration	1924	Chicago voters	Few days	N = 5,700	42.0%	33.0%	100.0%	13.4%
Gerber & Green 2000 (FE)	Door-to-door get-out-the-vote (GOTV) canvassing	No GOTV	Congressional election	Turnout	1998	New Haven voters	Few days	N = 29,380	47.2%	44.8%	27.9%	15.6%
	GOTV mailing of 1–3 cards	No GOTV							42.8%	42.2%	100%*	1.0%
Green et al. 2008 (FE)	Door-to-door canvassing	No GOTV	Local election	Turnout	2001	Voters in six cities	Few days	N = 18,933	31.0%	28.6%	29.3%	11.5%
Green & Gerber 2001 (FE)	Phone calls by youth vote	No GOTV	General election	Turnout	2000	Voters in four cities	Few days	N = 4,377	71.1%	66.0%	73.7%	20.4%
	Phone calls 18–30-year-olds	No GOTV	General election	Turnout	2000	Voters in two cities		N = 4,278	41.6%	40.5%	41.4%	4.5%

(*Continued*)

Table 1 (*Continued*)

Paper	Treatment (1)	Control (2)	Context (3)	Variable t (4)	Year (5)	Recipients (6)	Time horizon (7)	Sample size (8)	Treatment group t_T (9)	Control group t_C (10)	Exposure rate e_T–e_C (11)	Persuasion rate f (12)
DellaVigna & Kaplan (2007) (NE)	Availability of Fox news via cable	No Fox Network via cable	Presidential election	Republican vote share	1996–2000	28 U.S. States	0–4 years	N = 66 million	56.4%	56.0%	3.7%	11.6%$^{+}$
Enikolopov et al. 2010 (NE)	Availability of independent anti-Putin TV station (NTV)	No NTV	General election	Vote share of anti-Putin parties	1999	Russian voters	3 months	N = 45 million	17.0%	10.7%	47.0%	7.7%$^{+}$
Chiang & Knight 2009 (NE)	Unsurprising Democratic endorsements (NYT)	No endorsments	General election	Support for Gore	2000	Voters in four cities	Few weeks	N = 32,014	75.5%	75.0%	100.0%	2.0%
	Surprising Democratic endorsements (Denver)	No endorsments							55.1%	52.0%	100.0%	6.5%
Gerber et al. 2009 (FE)	Free 10-week subscription to *The Washington Post*	No subscription	Governor election	Democratic vote share (stated in survey)	2005	Virginia	2 months	N = 1,011	67.2%	56.0%	94.0%	19.5%$^{+}$
Gentzkow 2006 (NE)	Exposure to television	No television	Congressional election	Turnout	1940s–1950s	All U.S. counties	10 years	N = 100 million*	54.5%	56.5%	80.0%	4.4%
Gentzkow & Shapiro 2009 (NE)	Read local newspaper	No local paper	Presidential election	Turnout	1869–1928	All U.S. counties	0–4 years	N = 100 million*	70.0%	69.0%	25.0%	12.9%
Persuading donors												
List & Lucking-Reiley 2002 (FE)	Fund-raiser mailer with low seed	No mailer	Campaign for computer lab	Share giving money	1999	Florida donors	1–3 weeks	N = 1,000	3.7%	0%	100%*	3.7%

(*Continued*)

Table 1 (*Continued*)

Paper	Treatment (1)	Control (2)	Context (3)	Variable t (4)	Year (5)	Recipients (6)	Time horizon (7)	Sample size (8)	Treatment group t_T (9)	Control group t_C (10)	Exposure rate e_T–e_C (11)	Persuasion rate f (12)
	Fund-raiser mailer with high seed	No mailer						N = 1,000	8.2%	0%	100%*	8.2%
Landry et al. 2006 (FE)	Door-to-door fund-raising campaign for university center	No visit	Campaign	Share giving money	2004	North Carolina donors	Immediate	N = 4,833	10.8%	0%	36.3%	29.7%
DellaVigna et al. 2009 (FE)	Door-to-door fund-raising campaign for out-of-state charity	No visit	Campaign	Share giving money	2008	Chicago suburbs donors	Immediate	N = 946	4.6%	0%	41.7%	11.0%
Falk 2007 (FE)	Fund-raiser mailer with no gift	No mailer	No gift	Share giving money	2004	Swiss donors	1–3 weeks	N = 3,262	12.2%	0%	100%*	12.2%
	Mailer with gift (4 postcards)	No mailer						N = 3,347	20.6%	0%	100%*	20.6%
Persuading investors												
Engelberg & Parsons 2009 (NE)	Coverage of earnings news in local paper	No coverage	Trading of share	Trading of shares of stock in news	1991–1996	Investors in brokerage	3 days	N = 15,951	0.023%	0.017%	60.0%	0.010%

Notes: Calculations of persuasion rates by the authors. The list of papers indicates whether the study is a natural experiment (NE) or a field experiment (FE). Columns 9 and 10 report the value of the behavior studied (column 4) for the treatment and control group. Column 11 reports the exposure rate, that is, the difference between the treatment and the control group in the share of people exposed to the treatment. Column 12 computes the estimated persuasion rate f as $100 \times (t_T - t_C)/[(e_T - e_C)(1 - t_C)]$. The persuasion rate denotes the share of the audience that was not previously convinced and that is convinced by the message. The studies in which the exposure rate (column 11) is denoted by 100%* are cases in which the data on the differential exposure rate between treatment and control are not available. In these case, we assume $e_T - e_C = 100\%$, which implies that the persuasion rate is a lower bound for the actual persuasion rate. In the studies on persuading donors, even in cases in which an explicit control group with no mailer or no visit was not run, we assume that such a control would have yielded $t_C = 0\%$ because these behaviors are very rare in the absence of a fund-raiser. For studies with vote share as a dependent variable (denoted with a +), see the **Supplemental Appendix** for details on how the persuasion rate is calculated and for additional details (follow the Supplemental Material link from the Annual Reviews home page at **http://www.annualreviews.org**).

order business that include a code customers use when they reply. He compiles data on the response rates of each ad he placed and analyzes their relative effectiveness and the extent of diminishing returns.

Field experiments have long been used to study advertising effects, with many studies carried out by advertisers themselves. Hovde (1936), for example, discusses split-run experiments conducted in cooperation with the *Chicago Tribune* in which groups of subscribers are assigned to receive different advertising inserts in their Sunday papers. Similar split-run tests are discussed by West (1939), Zubin & Peatman (1943), and Waldman (1956). Ackoff & Emshoff (1975) report on one of the earliest television advertising experiments—a series of tests carried out by Anheuser-Busch between 1962 and 1964 in which different markets are assigned different advertising levels. A large number of other market-level and individual-level experiments have been carried out subsequently and reported in the marketing literature.

Overall, these studies provide little support for the view that there is a consistent effect of advertising spending on sales. The Anheuser-Busch studies find that both increasing and decreasing advertising increased sales; these results led the firm to significantly cut advertising in most of its markets. Aaker & Carman (1982) and Lodish et al. (1995) review large numbers of experiments and conclude that a large share of ads have no detectable effect. Hu et al. (2007) is the only review of experimental evidence that detects positive effects of advertising spending on average.[2]

Several recent papers by economists use field experiments to estimate the effect of persuasive communication on sales. The results, like those in the marketing literature, are mixed. Simester et al. (2007) vary the number of catalogs individuals receive by mail from a women's clothing retailer. They find that increasing the number of catalogs in an 8-month period from 12 to 17 increases the number of purchases during the test period by 5% for customers who had purchased frequently in the past and by 14% for those who had purchased relatively infrequently. The effect on the extensive margin (the share of customers who purchase at least one item) implies a higher persuasion rate for the frequent buyers ($f = 6.9$) than for the less frequent buyers ($f = 4.2$) (**Table 1**).[3] Lewis & Reiley (2009) report the results of an online advertising experiment involving more than a million and a half users of Yahoo! whose purchases were also tracked at a large retailer. Of the subjects in the treatment group, 64% were shown ads. The purchases of the treatment group were 3% greater than the purchases of the control group, but this difference is not statistically significant. Bertrand et al. (2010) randomize the content of direct-mail solicitations sent to customers of a South African lender. They vary the interest rates offered, as well as the persuasive features of the mailer, such as the picture displayed or the number of example loans presented. Some features of the mailers—the picture displayed, for example—do have large effects on loan takeup, whereas others do not—comparisons with competitors, for example.

A final body of evidence on advertising effects exploits naturally occurring variation. Bagwell (2007) reviews the large literature studying correlations between monthly or

[2]The results of all these studies must be interpreted with caution because the assignment to treatment and control conditions is often not randomized explicitly, and because the reported results often lack sufficient detail to assess the quality of the statistical analysis. Nevertheless, the negative results are striking given that the most obvious biases would tend to overstate the effect of advertising.

[3]In this case, we do not observe how many of the customers in the treatment group received and read the catalogs; that is, we do not observe e_T. In this and in similar subsequent cases, we assume $e_T - e_C = 1$, hence providing a lower bound for the persuasion rate.

annual measures of aggregate advertising intensity and sales. These studies frequently find large advertising effects, although the endogeneity of advertising expenditure makes interpreting the results difficult. A more promising approach is to exploit high-frequency variation in advertising exposure. Tellis et al. (2000), for example, analyze data from a company that advertises health care referral services on television, examining calls from customers to an 800 number listed on the screen. Under the assumption that customers who are persuaded by the ad call the 800 number in a short window of time, these data allow valid estimation of advertising effects. The authors find that an additional television ad in an hour time block generates on the order of one additional call. Similar assumptions justify studies by Tellis (1988) and Ackerberg (2001) who use high-frequency individual-level supermarket purchase data matched to individual-level advertising exposures. The latter study finds that an exposure to one additional commercial per week has the same effect on purchases of an average inexperienced household as a 10-cent price cut.

2.2. Persuading Voters

A second form of persuasion is communication directed at voters. Such communications may come from politicians themselves, interested third parties such as GOTV organizations, or the news media. The relevant behaviors include the decision to vote or not and the party chosen conditional on voting.

Early studies of political campaign communications find little evidence of effects on voters' choice of candidates. Lazarsfeld et al. (1944) and Berelson et al. (1954) track the voting intentions and political views of survey respondents over the course of presidential campaigns. They find that after months of exposure to intensive political communications, most respondents are more convinced of the political views with which they began. Summarizing this and other survey-based research, Klapper (1960, p. 50) writes "[R]esearch strongly indicates that persuasive mass communication is... more likely to reinforce the existing opinions of its audience than it is to change such opinions." For several decades subsequently, the consensus in political science and psychology was that political communication had "minimal effects" (Gerber et al. 2007).

More recent studies have identified stronger correlations between exposure to political communications and voting. Iyengar & Simon (2000) and Geys (2006) review this literature, which for the most part lacks compelling strategies for identifying causal effects. An exception is a field experiment on the effects of political advertising by Gerber et al. (2007). Working with a gubernatorial campaign in Texas, the authors randomly assign markets to receive an ad campaign early or late. Using a daily tracking survey of voters' attitudes, the authors find strong but short-lived effects of television ads on reported favorability toward the various candidates.

A separate literature examines the impact of GOTV operations. Among the earliest studies, Gosnell (1926) provided a reminder card stating the necessity of registration to a treatment group of 3,000 and no card to a control group of 2,700 voters. This card increased the registration rate from 33% in the control group to 42% in the treatment group, implying a persuasion rate of $f = 13.4$.

Building on these early studies, Gerber, Green, and coauthors run a series of GOTV field experiments (see Green & Gerber 2008 for a quadrennial review of this literature). In most of these experiments, households within a precinct are randomly selected to receive different GOTV treatments right before an election; the effects are measured using the public records of turnout, which can be matched ex post to the households targeted. Gerber & Green (2000) show that door-to-door canvassing increases turnout from 44.8% to 47.2% in a New Haven congressional election ($f = 15.6$). Mailing cards with the same information has a much smaller effect ($f = 1.0$). Green et al. (2008) find large effects of door-to-door campaigning in 2001 local elections ($f = 11.5$), and Green & Gerber (2001) demonstrate large effects of personal phone calls in the 2000 election ($f = 20.4$ in one sample and $f = 4.5$ in another). (The effect of phone calls from marketing firms is much smaller.) The remarkable effectiveness of a brief personal contact indicates how malleable the turnout decision is.

Beyond the literature on direct political communication, a number of recent papers focus on the effect of the news media. Four papers consider the role of partisan media on vote share: Two papers exploit idiosyncrasies of media technology that lead to variation in availability, one paper uses the precise timing of media messages, and a last paper uses a field experiment. DellaVigna & Kaplan (2007) exploit idiosyncratic variation in whether towns had Fox News added to their cable systems between 1996 and 2000. They find that Fox News availability increased the presidential vote share of Republicans in 2000 by half a percentage point, implying a persuasion rate of $f = 11.6$ of the audience that was not already Republican.[4] Enikolopov et al. (2010) use a related method to show that Russian voters with access to an independent television station (NTV) were more likely to vote for anti-Putin parties in the 1999 parliamentary elections ($f = 7.7$). Chiang & Knight (2009) use daily polling data to show that in the days following the publication of a newspaper endorsement for president, stated voting intentions shift toward the endorsed candidate ($f = 2.0$ for the unsurprising endorsement for Gore of *The New York Times* and $f = 6.5$ for the surprising Gore endorsement of *The Denver Post*). Gerber et al. (2009) use a field experiment to estimate the effect of partisan media coverage. They randomly assign subscriptions to a right-leaning newspaper (*The Washington Times*) or a left-leaning newspaper (*The Washington Post*) to consumers in northeastern Virginia one month before the November 2005 Virginia gubernatorial election. They find no significant effects on measures of political information or attitudes, but they do detect an increase in self-reported votes for the Democratic candidate among those assigned to *The Washington Post* ($f = 20.0$).

These studies imply a wide range of treatment effects of media exposure on vote share, with the effect of *The Washington Post* (11.2 percentage points) 28 times larger than the effect of Fox News (0.4 percentage points). Once we take account of differences in the share of subjects exposed to treatment, however, the effects are more similar, with persuasion rates for the main treatments of interest ranging from 6% to 20%.

A second set of papers on media effects considers the impact of the media on voter participation. Gentzkow (2006) uses a natural experiment—the diffusion of television in the 1950s—to study the effects of television access on voter turnout. Comparing observably similar counties that received television relatively early or relatively late, he finds that television reduced turnout by 2 percentage points per decade for congressional elections ($f = 4.4$) but had no significant effect for presidential turnout. He argues that substitution away from newspapers and radio (which provide relatively more coverage of local news)

[4]The persuasion rate for vote share as an outcome variable acknowledges that the message can cause party switches or turnout changes (see the **Supplemental Appendix** for the expression; follow the Supplemental Material link from the Annual Reviews home page at **http://www.annualreviews.org**).

provides a plausible mechanism. Gentzkow & Shapiro (2009) exploit sharp timing to estimate the effect of newspaper entries and exits on voting using data from 1868 to 1928. They find that the first newspaper in a county significantly increases voter turnout by 1 percentage point ($f = 12.9$). In contrast to the studies above, they find that partisan newspapers do not have significant effects on the share of votes going to Republicans. A possible reconciliation is that voters filter out bias for media that explicitly state their partisan affiliations, as newspapers did in the period 1868–1928, but not for media that claim objectivity, as in the modern media context.

2.3. Persuading Donors

A third form of persuasion is communications from nonprofits or charities to solicit contributions. The outcome measures are monetary donations or nonmonetary contributions, such as of time or blood.

Some of the earliest studies are in psychology and sociology and examine the determinants of blood donation, recycling, and helping decisions, often using experiments. These studies document the importance of in-person contacts (Jason et al.1984) and the delicate role of incentives in inducing prosocial behavior: For example, paying people to donate blood may reduce the donations because it crowds out intrinsic motivation (Titmuss 1971). Recently, two economists (Mellstrom & Johannesson 2008) test this hypothesis using a field experiment. Among women, offering a monetary compensation of approximately $7 lowers the rate of blood donations from 51% in the control group (with no pay) to 30%.

Turning to the studies of fund-raising and monetary donations, List & Lucking-Reiley (2002) send letters to raise funds for the purchase of computers for a center and randomize the amount of seed money (the amount already raised) stated in the different letters. In the low-seed treatment, 3.7% of recipients donate a positive amount, compared with 8.2% in the high-seed treatment. One interpretation is that seed money serves as a signal of charity quality.

Landry et al. (2006) conduct a door-to-door campaign to fund-raise for a capital campaign at East Carolina University. In their benchmark treatment (**Table 1**), 36.3% of households open the door, and 10.8% of all households contacted (including the ones that do not open the door) donate, for an implied persuasion rate of $f = 29.7$. DellaVigna et al. (2009) also conduct a door-to-door field experiment and find a sizeable persuasion rate of $f = 11.0$, even for a relatively unknown out-of-state charity. Falk (2007) shows that small gifts can significantly increase donations. Solicitation letters for schools in Bangladesh induced substantially higher giving if they were accompanied by postcards designed by students of the school (20.6% giving) than if they were accompanied by no postcard (12.2% giving).

2.4. Persuading Investors

The fourth form we consider is communication directed at investors—by firms themselves (earnings announcements), by financial analysts (buy/hold/sell stock recommendations and earnings forecasts), or by the media. The function of analysts as a third party in financial communications is similar to that of the media in political communications. The outcomes in these studies are typically aggregate response of stock prices, or occasionally individual behavior.

An early event study examining investor response to earnings information is Ball & Brown (1968). Using the difference between current and previous annual earnings as a measure of new information, the authors find a significant correlation with stock returns in the two days surrounding the earnings release. More recent studies (see Kothari 2001 for a review) use the median analyst forecast (the so-called consensus forecast) to measure investor expectations and detect an even larger response to earnings news. Companies in the top decile of earnings news experience on average a positive return of 3% in the two days surrounding the release, compared with an average −3% return for companies in the bottom decile of news.[5]

An early study of the impact of analyst recommendations is Cowles (1933). Using data on 7,500 stock recommendations made by analysts in 16 leading financial services companies between 1928 and 1932, he estimates that the mean annual returns of following the analyst recommendations are negative at −1.43%. Little research follows this negative result until systematic data sets of analyst recommendations and forecasts became available in the 1980s and 1990s. Using one of these data sets (First Call), Womack (1996) shows that on the three days surrounding the addition of a stock to a list of buy recommendations, stock returns increase 3.27%; conversely, the addition to a list of sell recommendations is accompanied by negative returns (−4.32%). These returns are not explained by earnings news. Later studies such as Barber et al. (2003) largely confirm these results.

Engelberg & Parsons (2009) study the impact of financial reporting by the media. They use individual trading records for a brokerage house to study the way local investors respond to coverage of earnings announcements in local newspapers. They find that a company whose earnings news is covered in the newspaper experiences significantly higher local trading in the three days around the announcement. The low persuasion rate ($f = 0.01$) reflects the fact that individual investors trade relatively infrequently.

3. WHAT MODELS BEST CAPTURE THE RESPONSE TO PERSUASIVE COMMUNICATION?

The evidence reviewed above provides a measure of the effectiveness of persuasive messages in different settings. What factors determine the way a particular message affects receivers' behavior? Existing models of persuasion effects can be divided broadly into two categories.

In the first category, persuasion affects behavior because it changes receivers' beliefs. This includes models in which receivers are rational Bayesians, such as informative (Stigler 1961, Telser 1964) and signaling (Nelson 1970) models of advertising, cheap-talk models (Crawford & Sobel 1982), and persuasion games (Milgrom & Roberts 1986). It also includes models in which receivers are not fully Bayesian and think categorically (Fryer & Jackson 2008, Mullainathan et al. 2008), have limited memory (Mullainathan 2002, Shapiro 2006), double-count repeated information (DeMarzo et al. 2003), or neglect the incentives of the sender (Eyster & Rabin 2009). We refer to these models as belief based.

In the second category, persuasion affects behavior independently of beliefs. This includes models such as those of Stigler & Becker (1977) and Becker & Murphy (1993) in which advertising enters the utility function directly, as well as older models of persuasive advertising (Braithwaite 1928). This category also includes some dimensions of

[5]These numbers, which are from DellaVigna & Pollet (2009), are representative of the literature.

psychological models of persuasion in which noninformative peripheral factors may play a central role (e.g., see Petty & Cacioppo 1986, 1996). We stretch terminology somewhat and refer to all such models as preference based.

Distinguishing different models of persuasion is particularly important because they have quite different implications for policy and welfare. In a simple belief-based model with a single rational receiver, the existence of persuasive communication cannot make the receiver worse off (Kamenica & Gentzkow 2010). In this case, increasing the supply of information and making information markets more competitive will often improve welfare. Welfare effects are harder to evaluate if receivers are not Bayesian or if persuasion works through emotion or preference change.

Regardless of the model, messages are only effective if they are actually received. In many settings, receivers make active decisions about what information to seek out and how to allocate their attention, and the way they make these decisions has important implications for the effectiveness of persuasion in equilibrium. At the end of this section, we briefly review evidence on the way endogenous exposure mediates persuasion effects.

3.1. Predictions of Belief-Based Models

A first core prediction of most belief-based models is that persuasion will tend to be more effective when receivers are less certain about the truth. In Bayesian models, the weaker receivers' priors are, the more their beliefs are affected by a given piece of new information (holding everything else constant). This may, although need not, imply larger effects on behavior. In limited memory or categorical thinking models, behavior will also typically be less elastic when receivers are close to certain about the state ex ante.

Ackerberg (2001, 2003) tests the prediction that advertising has a larger effect for consumers who have little experience with a product. His study combines data on a panel of consumers' purchases with data on their exposure to television advertisements, focusing on a new brand of yogurt, Yoplait 150. The identification of advertising effects here relies on individuals' exposure to ads for the yogurt being orthogonal to their predetermined taste for yogurt. Ackerberg shows that consumers who have bought the product in the past (and so have more information about its characteristics) are less sensitive to advertising than those who have never bought the product, consistent with the prediction. As mentioned above, the effect of an additional ad per week on inexperienced households is equivalent to a 10-cent price cut; the effect on experienced households is one-fifth the size and not significantly different from zero.

Several of the other studies summarized in Section 2.1 also look at the interaction between advertising and consumer experience. Simester et al. (2007) show that the effect on purchases of sending catalogs is larger on the intensive margin for consumers that previously purchased infrequently than for consumers that previously purchased frequently. Tellis et al. (2000) find that advertisements for a health care referral service have larger effects in markets in which the service was only recently introduced. Beginning with Shryer (1912), a number of studies find diminishing returns to repeating the same advertisement (at least as the number of repetitions gets large), which is consistent with receivers' priors becoming increasingly strong over time.

The role of receiver priors has also been tested in the domain of political persuasion. Zaller (1992) shows that individuals with high political awareness updated their views of Ronald Reagan less in the wake of the Iran-Contra Affair, in part because their prior knowledge of Reagan's performance was more extensive. Prior (2006) uses survey data from 1958 to 1970 to estimate the cross-sectional correlation of knowledge of incumbent House politicians and propensity to vote for incumbents, on the one hand, and availability of television stations, on the other hand. He finds no systematic relationship on average but finds a positive correlation for less-educated voters. Such correlations must be interpreted with caution, but they are consistent with the view that the effects of television should be greatest among voters who have the least prior knowledge.

A second prediction specific to Bayesian belief-based models is that receivers' inferences from a given message will depend on what they know about the credibility of the sender. A Republican endorsement from a newspaper that always endorses Republicans should carry less weight than a Republican endorsement from a newspaper that typically endorses Democrats. Non-Bayesian models do not necessarily share this prediction, and Eyster & Rabin (2009) posit specifically that receivers will adjust too little for sender credibility.

The study by Chiang & Knight (2009) discussed above provides some evidence from the political arena. Consistent with the Bayesian model, they find large effects of newspaper endorsements on voting intentions only in cases in which the endorsement is a surprise, in the sense that the paper supports a party it typically opposes. When a newspaper endorses the same party repeatedly, their endorsements have no significant effect, although the confidence intervals are large.

Most evidence on source credibility comes from the literature on financial analysts. Kadan et al. (2008) study a 2002 regulation that required brokerage houses to publicize the share of their analysts' recommendations in the sell, hold, and buy categories (NASD Rule 2711 and amended NASD Rule 472). In response, most houses increased the share of sell and hold recommendations: After the regulation, approximately 20% of the recommendations are sell and 44% hold, up from 5% and 26% before the regulation, respectively. Consistent with the Bayesian model, stock prices after the reform respond more to buy recommendations (which are now less common and hence more informative) and less to sell and hold recommendations (which are more common and less informative). Of course, this does not show that receivers make correct inferences from these recommendations, only that their inferences shift in the predicted direction.

Additional evidence on source credibility comes from studies of analysts' conflicts of interest. As discussed at more length below, analysts face strong incentives to provide positive recommendations. These incentives are especially strong for affiliated analysts—those whose companies also provide investment banking services to the companies the analysts cover. Malmendier & Shanthikumar (2007) ask whether investors take these incentives into account. They first replicate previous findings showing that affiliated analysts systematically give more buy or strong buy recommendations than unaffiliated analysts. The bias is sufficiently strong that a rational investor should essentially neglect the recommendations of affiliated analysts. The authors then show that institutional investors (proxied by large trades) do not respond to buy and strong buy recommendations issued by affiliated analysts, whereas individual investors (proxied by small trades) appear to take the recommendations at face value: They buy in response to buy recommendations and hold in response to hold recommendations, and do not distinguish between affiliated and not affiliated analysts. De Franco et al. (2007) focus on a specific set of analyst recommendations that were alleged by the SEC to have been deliberately distorted as a result of conflicts of interest. Consistent with Malmendier & Shanthikumar (2007), they show that individual investors buy in response to the optimistically biased recommendations. They also show that institutional investors sell in response to the optimistic recommendations, consistent with them recognizing both that the recommendations are biased and that individual investors will over-respond. Taken together, this evidence suggests that sophisticated agents adjust for sender credibility as the Bayesian model would predict, whereas inexperienced agents underadjust, as in Eyster & Rabin (2009).

We discuss one laboratory study because it is so directly relevant to the issue at hand. Cain et al. (2005) pay subjects for their precision of the estimates of the number of coins in a jar. Because these subjects see the jar only from a distance, they have to rely on the advice of a second group of subjects, the advisors, who can look at the jar up close. The two experimental treatments vary the incentives for the advisors. In a first treatment, the advisors are paid for how closely the subjects guess the number of coins; in a second treatment, the advisors are paid for how high the subjects' guess is. Despite the fact that the incentives are common knowledge, the estimate of the subjects is 28% higher in the second treatment. The leading interpretation of this finding is that the subjects do not discount enough for the conflict of the incentives of the advisors.

3.2. Predictions of Preference-Based Models

The simplest prediction that distinguishes preference-based models from belief-based models is that the messages may affect behavior even when they convey no information. Conclusively identifying such persuasive effects is difficult because even apparently noninformative features of messages may still serve as informative signals in equilibrium (Nelson 1970). Also, noninformative dimensions may affect belief formation through channels such as framing, salience, and attention (Zaller 1992, Mullainathan et al. 2008), blurring the distinction between belief-based and preference-based models. Nevertheless, many pieces of evidence on how persuasion operates are hard to rationalize with at least the simplest belief-based models of persuasion.

One piece of evidence is the content of messages themselves. Many have noted, for example, that advertisements typically contain imagery, humor, narrative, and other content that do not convey any obvious information. Mullainathan et al. (2008) note the example of a shampoo brand advertised with a slogan "We put silk in a bottle," even though the firm acknowledges that silk has no effect on the performance of shampoo. The authors also show that the noninformational content of Merrill Lynch advertising campaigns varies systematically with market conditions. Their ads' images evoke security and reliability (e.g., a grandfather fishing with his granddaughter) when market growth is low and evoke modernity and aggressiveness (e.g., a bull wired to a circuit board) when market growth is high. They argue that these patterns are most consistent with a model in which firms design ads to tap into consumers' existing beliefs rather than to convey or signal new information about their products.

In a demonstration of the effect of noninformational content, Bertrand et al. (2010) randomize the content of direct-mail solicitations sent to customers of a South African lender. They vary the interest rates offered, as well as features of the mailer such as the picture displayed and the number of example loans presented. The authors find that the persuasive features are jointly (marginally) significant in predicting loan takeup. The manipulations with the strongest effects are (*a*) presenting a simple table with only one example loan rather than several, (*b*) not including a suggested use for the loan, (*c*) and including a picture of an attractive female. All three of these effects are roughly equivalent to a two-percentage-point reduction in the monthly interest rates (**Table 1**; the rate varied from 3.25% to 11.75%). The pattern of results is not clearly organized by any particular theory of how advertising content matters, but it provides evidence that dimensions that to a first approximation do not provide information, such as the attractive picture, can have large effects.

Landry et al. (2006) present related evidence from the door-to-door fund-raising campaign discussed in Section 2.3. A one-standard-deviation increase in attractiveness of the female solicitors increases the amount raised by 50%. The effect only occurs when males open the door. This suggests that the personal interaction impacts the willingness to pay. The importance of personal interaction is also consistent with the pattern of results in Gerber & Green (2000), who find the largest persuasion rates for in-person visits, followed by phone calls and then mailers.

A second prediction that distinguishes preference-based models from belief-based models is that receivers may take costly steps to avoid exposing themselves to persuasion. Because there is free disposal of information, messages in a belief-based model cannot make receivers worse off in expectation (except for a time cost), so we should not generally see costly avoidance behavior. DellaVigna et al. (2009) provide evidence of costly avoidance in the context of charitable giving using a field experiment. They compare the fund-raising in a standard door-to-door campaign with a campaign in which the households are notified a day in advance about the upcoming fund-raising drive with a door hanger. They find that the door hanger reduces the share of households at home by 10%–25% and lowers giving by 30% if the door hanger has a do-not-disturb check box. This suggests that the persuasion of donors operates in part through social pressure, inducing households to take costly steps to avoid exposure to the solicitation.

A final prediction specific to models like Becker & Murphy's (1993), in which persuasive messages and consumption are complements, is that increasing the level of consumption should increase the marginal utility of messages. Suppose, for example, that c is quantity consumed, A is the number of ads viewed, and utility is $U(c, A)$, with $\partial^2 U/\partial c \partial A > 0$. In such a model, increasing A increases the marginal utility of c, rationalizing the effect of advertising on consumer demand. If this is true, then increasing c must also increase the marginal utility of A. Someone who owns a Ford truck should be more likely to sit through Ford ads than Toyota ads. This prediction has received some support from laboratory experiments by psychologists (Ehrlich et al. 1957, Mills 1965), but we are not aware of any empirical tests from the field.

3.3. Demand for Information and Limited Attention

In many settings, the effectiveness of persuasion depends on receivers' decisions about what information to seek out and how to allocate attention.

Several studies show that potentially valuable information is ignored even when it is public information, due to either high costs of information acquisition or nonrational limited attention (see DellaVigna 2009). Huberman & Regev (2001) chronicle the market reaction to results suggesting a drug patented by the company EntreMed, Inc., might cure a type of cancer. On November 28, 1997, these results were reported by *Nature* and by *The New York Times* on page A28. Unsurprisingly, the stock price of EntreMed increased by 28%. Five months later, on May 4, 1998, *The New York Times* published on the front page an article on EntreMed that is almost identical to the article published earlier. Despite the fact that the article contained no new hard information, it led to a 330% one-day return for EntreMed and to a 7.5% one-day return for all biotech companies, moving billions of dollars in market capitalization. The stock price of EntreMed did not revert to the previous level over the entire next year. Several interpretations of these events are possible, but what is clear is that the way public financial information is disseminated can significantly affect the market reaction.

Two studies document more systematically the importance of limited attention in the context of quarterly earnings releases by companies. As discussed in Section 2.4, companies that release positive earnings news experience an increase in stock returns over the next two to four quarters. A leading interpretation of this phenomenon is that investors are slow to respond to the new pieces of information (Hong & Stein 1999). If this is the case, one would expect even more under-reaction to earnings news on days when investors' costs of processing the information are high. DellaVigna & Pollet (2009) examine releases taking place on Friday (versus other weekdays), under the assumption that the weekend is a distracting force. Hirshleifer et al. (2009) examine releases taking place on days with a higher number of earnings announcements, under the assumption that attention is a fixed resource. The two papers find similar evidence that on low-attention days, the initial incorporation of the earnings news into stock returns is 20% slower, with a higher drift. An obvious confound for these papers is the fact that companies select when to release their earnings. However, the selection would need to explain why companies releasing on low-attention days experience both less immediate response and more delayed response.

The endogeneity of receivers' attention is also important in political persuasion. A persuasive argument to vote Republican will have little effect if it only reaches those who are already committed Republicans. (It can still have an effect if it affects the turnout decision.) The classic studies of political campaigns by Lazarsfeld et al. (1944) and Berelson et al. (1954) demonstrate that most voters are exposed mainly to campaign messages consistent with their pre-existing beliefs. Similarly, several studies of news markets document a strong demand on the part of consumers for news that has a political slant consistent with their own views (Gentzkow & Shapiro 2004, 2010). This may be driven by both irrational confirmatory bias (Lord et al.1979) and rational inferences about quality by consumers with heterogeneous priors (Gentzkow & Shapiro 2006). Regardless of the mechanism, it implies that the overall effect of persuasive messages could be smaller than it would be in a world where receivers' demand for news was independent of their prior beliefs.

4. WHAT ARE SENDERS' INCENTIVES?

Most of the studies reviewed above treat the content or quantity of persuasive messages as exogenous and study the effect on receivers' behavior. In markets, however, the supply of persuasion is endogenous. It is therefore important to understand the forces that determine the supply of persuasive messages in equilibrium.

Senders' incentives in persuasive markets are complex. By assumption, they have an interest in affecting receivers' behavior. This could be direct (e.g., an advertiser wants to convince a consumer to buy a product) or indirect (e.g., a newspaper wants to persuade voters to support Republicans because it receives kickbacks from the Republican party). A countervailing force for accuracy is the desire to build a reputation: If receivers are rational, senders may benefit from committing to limit the incentive to distort, or to report accurately. These two forces—the incentive to distort and the incentive to establish credibility—play out differently in different markets, and their relative strength will be a key determinant of the extent to which persuasive communications have beneficial or harmful effects.

Market structure interacts with these forces. Even if a monopoly sender has no incentives to build credibility, a sender in a competitive market may. A media firm that distorts news, for example, may pay a significant cost if this fact is revealed by its competitors, as long as the audience cares sufficiently about accuracy and consumers have largely rational beliefs.

4.1. Incentives of Advertisers

In the simplest model of advertising, firms do not internalize any benefits from accuracy. They just want to sell. As such, communication can be pure cheap talk. This tendency may be limited if senders include verifiable information or if regulation or reputation creates incentives for accuracy. Also, advertising campaigns can have an effect even if they do not convey credible information, as long as they have a direct impact on preferences. That advertising is partly or mostly cheap talk may partly explain the failure to find consistent effects on receiver behavior (Section 2.1).

One domain in which distortions in advertising have been quantified is pharmaceutical advertising in medical journals. Villanueva et al. (2003), for example, study 264 advertisements for antihypertensive and lipid-lowering drugs published in Spanish medical journals in 1997. They count the number of claims in the ads that were supported by bibliographic citations and then assess whether the studies cited indeed back up the claims. The authors find that the 44% of the claims are not supported by studies. Cooper & Schriger (2005), van Winkelen et al. (2006), and Greving et al. (2007) perform similar analyses, finding large numbers of claims that are not supported by research or that are supported only by research sponsored by the manufacturer.

The conflict of interest induced by the advertisers' incentives implies an important role for potentially objective third parties. For example, *Consumer Reports* provides product ratings, *U.S. News & World Report* provides university rankings, and the *Americans for Democratic Action* provides quantitative measures of the voting record of politicians. The information from certifiers can have substantial effects on consumer behavior. Jin & Leslie (2003) study the introduction of health scores for restaurants in the Los Angeles area. Following a prominent food-poisoning episode, different areas in Los Angeles required restaurants to prominently post a hygiene score. Jin & Leslie find that the introduction of the report cards substantially increases the attendance to highly rated restaurants and lowers the incidence of food-poisoning episodes at hospitals. Although disclosure by third parties can have a significant beneficial impact, as in this case, the record in general is more mixed, as Dranove & Jin (2010) discuss in a review of the evidence.

4.2. Incentives of the Media

Media firms face complex incentives. Most obviously, they benefit from increasing consumer willingness to pay in terms of money and time for their products. This generates both direct revenue (newspaper or magazine subscriptions, for example) and revenue from advertisers who are willing to pay more to reach more consumers. Whether catering to consumers leads to the provision of accurate information depends on what consumers demand. If consumers value accuracy, market incentives will usually push firms to provide it, so long as ex post feedback on which stories were right and wrong is sufficiently strong. If consumers do not value accuracy and are just as happy with fiction that entertains them or supports their political beliefs, the scope for distortion will be large.

The scope for distortion also depends on other supply-side incentives of firms to manipulate content. Media owners may have personal preferences over political outcomes. Politicians, advertisers, or other interested parties may exert pressure on media firms to mold content to fit these parties' preferences. Reporters may prefer writing stories that align with their personal political views.

To evaluate the importance of these forces in the U.S. newspaper markets, Gentzkow & Shapiro (2010) use automated searches to measure the political slant of 420 U.S. newspapers. They use these measures to estimate the demand for slant (the readers' preferences) and the supply of slant (the newspaper's preferences). They document a statistically and economically significant demand for slant consistent with consumers' own ideologies. The data do not reject the hypothesis that newspapers respond to this demand by choosing slant to maximize circulation. The authors then examine the role of ownership. Once they control for geographic clustering of ownership groups, they find that two newspapers with the same owner are no more similar politically than two random newspapers, implying small (if any) ownership effects. Also, they do not find any evidence of a role of reporter preferences and the party of local or state politicians in determining slant. They conclude that the role of supply-side incentives in shaping the average slant of U.S. newspapers is likely to be small and that, on average, the newspaper political slant is determined by demand.

Other studies show that supply-side incentives can sometimes be important. Larcinese et al. (2007) present a case study of the editorial and news content of the *Los Angeles Times* before and after Otis Chandler took over in 1960. Chandler set out to change the previous Republican orientation of the paper. Indeed, the *Los Angeles Times* shifted from endorsing mostly Republican candidates before 1960 to endorsing mostly Democrats by 1970, whereas no corresponding change in the political preferences of the electorate took place at the same time. As an additional measure of supply-side bias, before 1960 the journal provided less coverage of high unemployment under Republican presidents than under Democratic presidents, but this bias disappears after 1965. Larcinese et al. extend this analysis to a cross section of newspapers and present some evidence that the partisan coverage of unemployment news responds more to owner preferences (measured by newspaper endorsements) than to local electoral preferences. Gilens & Hertzman (2008) show that newspapers whose parent companies have an interest in television stations affected by a proposed deregulation of broadcast television cover the debate over that deregulation significantly differently than those whose parent companies do not have such an interest.

Durante & Knight (2011) test for ownership effects in the Italian media in which one entrepreneur, Silvio Berlusconi, owns the three major private television stations and indirectly exercises control over the public television station when his party is in power. Using measures of on-air time for the prime minister and opposition party leader, Durante & Knight find substantial ownership effects. Berlusconi's television stations devote substantially more time to the prime minister when Berlusconi's coalition is in power than when the other coalition is leading the government. Moreover, the share of time devoted to the different politicians by the public station shifts once Berlusconi's coalition comes into power. Even then, one public channel (Rai 3) offers more balanced coverage. Interestingly, some of the audience switches to this channel from the other channels when Berlusconi's party gets into power. This suggests a demand for less politicized information, even though this substitution effect is only partial.

Another form of supply-side incentive comes from advertisers. As the media depends heavily on advertising for revenue, advertisers may push quid pro quo implicit agreements to increase their advertising expenditure as long as the media coverage is positive toward their products. Reuter & Zitzewitz (2006) show that financial magazines that depend heavily on advertising from mutual funds appear to bias their reviews of funds in favor of their advertisers. The identification is based on considering how the coverage of different mutual funds in the news section (including recommending a fund) varies as a function of the advertising space purchased by a mutual fund family in the previous 12 months. Interestingly, *The New York Times* and *The Wall Street Journal* display no such correlation, suggesting that a reputation for journalistic independence can indeed limit these distortions.

4.3. Incentives in Financial Reporting

Firms often have an incentive to distort their financial reports to make outcomes look more favorable to investors, at the cost of making these reports less informative. Such distortions are substantially constrained, however, by regulation. In both quarterly and annual releases, the companies report earnings (profitability) per share, which by regulation must conform to one of two accounting standards (the GAAP or street number). Hence, whereas the CEO in the periodic communication can emphasize underlying trends, new products, or significant investments, the attention of the investors is largely focused on one standardized number. Moreover, earnings releases occur at a prescheduled time, and firm managers cannot release any profitability information in advance of this call. This regulation ensures a high information content of financial releases, consistent with the large effects of earnings news discussed in Section 2.4.

Despite the constraints imposed by regulation, several studies present evidence that firms manipulate reported earnings. DeGeorge et al. (1999) document an asymmetry in the distribution of earnings surprises: There are substantially more announcements that meet the analyst consensus forecast by 1 or 2 cents than announcements that fail to meet the forecast by 1 or 2 cents. Firms that would barely miss the forecast, anticipating a negative response by investors, adopt accounting management to meet the expectations.

Accounting management typically involves intertemporal substitution of certain discretionary items, such as accounts receivable, and so is likely to lead to more negative earnings releases in the future. Hirshleifer et al. (2004) show that firms with a high value for net operating assets, a proxy for accounting management, experience in later quarters worse earnings news, as well as substantially lower stock returns. A trading strategy based on these results earns annual returns in excess of 15%. This suggests that investors do not fully appreciate the extent of the accounting manipulations, which in turn makes it worthwhile for companies to undertake them.

A more subtle manipulation exploits the two measures of earnings, the GAAP number and the street (also called proforma) number, which differ in the treatment of extraordinary items such as restructuring charges. Dyck & Zingales (2003) show that firms report the more favorable number more prominently in their press release. They also show that the media coverage of the earnings tends to follow the same pattern. In response, the stock price responds more to the number that the firm emphasized than to the other number. Again, the fact that investors do not undo the accounting distortion makes it profitable for firms to engage in such behavior in equilibrium.

4.4. Incentives of Financial Analysts

Unlike companies advertising their products, analysts provide information for which accuracy is easy to measure. Earnings forecasts (e.g., 5 cents per share) can be compared with the actual earnings release. Buy/hold/sell stock recommendations can be benchmarked against the stock performance. Such ex post verifiability can significantly limit the incentives for distortion. We might expect that maximizing forecast precision should be the key incentive for analysts.

However, analysts also face strong incentives to provide forecasts favorable to the companies they cover. Analysts that provide positive coverage of a company have easier access to company information and are not subject to continuous pressure by the company to change their outlook. Additional distortions exist for sell-side analysts—those that work within investment banks. Investment banks derive little if any revenue from selling analyst reports, which quickly enter the public domain. The major sources of profits are corporate finance transactions, such as mergers and secondary equity issuances. Analysts can face enormous pressure to provide positive coverage of companies that provide such transactions, making conflicts of interest especially strong for affiliated analysts.

Because analysts' careers are observable, it is possible to study how promotions and demotions depend on the precision in forecasts and on the bias of the forecasts. Hong & Kubik (2003) measure the movements of analysts between high-status brokerage houses (such as Goldman Sachs) and low-status brokerage houses (typically more specialized ones). They relate the likelihood of these movements to measures of the accuracy of forecasts (the mean absolute forecast error for past earnings forecasts, relative to other analysts) as well as measures of optimism (the fraction of forecasts that are above the consensus forecast). The key result is that optimism counts more than accuracy in determining career shifts. An analyst in the top 10% of optimism scores is 90% more likely to be promoted, compared with the remaining analysts. The corresponding effect of being in the top 10% of accuracy scores is only a 41% increase in the promotion probability. Similarly, forecast optimism lowers the probability of demotion more than accuracy. The authors also find (marginally) statistically significant evidence that, for demotions of affiliated analysts, who face a stronger conflict of interest, optimism matters more and accuracy less.

Does this conflict of interest affect recommendations in equilibrium? Approximately 60% of recommendations are buy or strong buy, and less than 5% of recommendations are sell or strong sell recommendations. This substantial asymmetry may itself suggest bias induced by conflict of interest. More compelling evidence is that the bias in favor of buy recommendations is stronger for affiliated analysts, for which the share of buy or strong buy recommendations is larger than 70%.[6]

[6]Although the distortions plausibly result from conflict of interest, an alternative interpretation is that they instead result from optimism: Analysts choose to cover companies for which they have a positive outlook. This alternative interpretation, however, does not explain why affiliated analysts, who face a stronger conflict of interest, have an even larger bias.

The size of the distortion is such that on average a sophisticated investor should interpret a buy recommendation as a recommendation to hold a stock, and a hold recommendation as an invitation to sell. In addition, investors should essentially neglect the recommendations of affiliated analysts. As discussed above, this is precisely how institutional investors appear to respond to recommendations, whereas individual investors fail to adjust for these distortions (Malmendier & Shanthikumar 2007).

The distortions in quarterly earnings forecasts take a more nuanced format. Companies generally prefer optimistic earnings forecasts. However, when the earnings release is imminent, the preference shifts toward cautious forecasts, which are easier to meet or exceed. This is particularly true given that, especially in recent years, top managers can only sell stock in their company in a short time window after the earnings announcement, and they benefit from a positive earnings surprise. Consistent with analysts responding to these incentives, Richardson et al. (2004) document a "walk-down" of analyst forecasts for the 1990s: Forecasts are the most optimistic at horizons of one year or more before the release, and they become monotonically less optimistic but remain largely above the (ex post) realized earnings until three to four months before the release, at which point they turn pessimistic. In the 1980s, when manager incentives to boost short-term stock prices were lower, there is still a walk-down, but the forecasts remain optimistic over the whole sample.

Furthermore, we expect the most biased analysts to provide both the most positive recommendations and the least positive earnings forecasts near the release date. Indeed, there is a negative correlation between recommendations and forecasts for affiliated analysts, for whom the conflict of interest is strongest (Malmendier & Shanthikumar 2009).

To our knowledge, analysts' forecasts are the only domain for which there is direct evidence on the effect of competition. Hong & Kacperczyk (2010) consider the shifts in analyst competition induced by the merger of investment banks. Following such mergers, analysts covering similar stocks in the two banks are often laid off. Using these mergers as instruments for decreased competition, Hong & Kacperczyk estimate that the remaining analysts that now face less competition increase their optimism bias in earnings forecasts by approximately 10%. This increase in bias holds also when the authors focus on analysts working in banks not affected by the merger. Hong & Kacperczyk also document a similar effect on optimism in long-term growth forecasts and a smaller effect on recommendations. Hence, it appears that competition may moderate the analyst bias, although it is unlikely to erase it.

5. HOW DOES PERSUASION AFFECT EQUILIBRIUM OUTCOMES?

The evidence reviewed above sheds light separately on the responses of receivers and on the behavior of senders. The ultimate welfare effects of persuasion, however, depend on the way senders and receivers interact in equilibrium. In this section, we review a handful of studies that estimate the equilibrium effects of persuasive communications.

One series of four studies considers how communication through the news media affects equilibrium policy outcomes. These studies are distinguished from those reviewed in Section 2.2 because they consider the equilibrium response of politicians to persuasive communication between the media and voters. The common theme in these studies is that media coverage leads politicians to respond more to the demands of voters, in most cases plausibly increasing voter welfare. Stromberg (2004) studies the diffusion of radio in the

1930s. Using plausibly exogenous variation in the availability of radio signals, he shows that localities that received radio obtained larger quantities of federal dollars during the New Deal, consistent with a model in which better information strengthens representatives' incentives. Similarly, Stromberg & Snyder (2010) find that more local newspaper coverage, instrumented with the congruence between congressional districts and newspaper markets, leads representatives to exert more effort directed at constituent interests (as measured by testifying before committees and serving on committees that control pork spending) and to bring home more federal dollars. Besley & Burgess (2002) show that aid to Indian states from 1958 to 1992 responds more to food shortages and floods in areas with higher newspaper circulation per capita (controlling for income and other demographics). The results are driven mainly by circulation of local language newspapers.

Whereas the above studies examine the impact of cross-sectional variation in media coverage, Eisensee & Stromberg (2007) consider the influence of high-frequency variation in media coverage on the provision of foreign aid. They first show that natural disasters that occur at the same time as other newsworthy events, such as the Olympics, receive much less news coverage than disasters that occur at other times. Using this variation to instrument for news coverage of disasters, they estimate that news coverage increases the probability that the United States sends aid by approximately 16% on average and by as much as 70% for stories on the margin of coverage. They interpret these results to mean that public outcry over disasters is largely driven by news coverage and that it is the public response that provides an incentive to politicians to send aid.

A second category of studies on the equilibrium effects of persuasion is the extensive empirical literature on the indirect effects of advertising. The direct communication between advertisers and consumers indirectly affects market structure, profits, product quality, and prices. Many of these papers study cross-sectional or time-series correlations between measures of advertising intensity and outcome variables, which, given the endogeneity of advertising, do not have a clear causal interpretation. We focus on the evidence on whether limits on retail advertising affect equilibrium retail prices. This literature speaks directly to the question of whether advertising promotes competition by decreasing search costs and increasing market transparency, as argued by Stigler (1961) and others.

Bagwell (2007) reviews a number of studies, beginning with Benham (1972), that look at the cross-sectional relationship between advertising restrictions and price levels. In markets for eyeglasses, prescription drugs, gasoline, and optometry, these studies all find that prices are significantly lower in markets in which price advertising is allowed relative to markets in which it is banned.

Two studies use changes in firms' ability to advertise, rather than cross-sectional correlations. Glazer (1981) studies a 1978 newspaper strike in New York City. The strike significantly reduces the supply of newspaper advertising space for supermarkets in Queens, but not as much for supermarkets in neighboring Nassau County. Prices of the six products studied rose approximately 6% in Queens relative to Nassau during the strike and returned to their earlier relative levels after the strike. Prices in local groceries in Queens (which do little newspaper advertising) did not change significantly. Milyo & Waldfogel (1999) study a 1996 Supreme Court decision that ended a ban on price advertising by liquor stores in Rhode Island. Consistent with a procompetitive effect of advertising, the authors estimate that, relative to a control group of stores in Massachusetts not affected by the ban, prices fell by between 0.4% and 0.8% in Rhode Island after the ban, although, in contrast to the earlier literature, these differences are not statistically significant.

6. CONCLUSION

We now have estimates of persuasive effects across a range of domains. The most reliable of these studies apply convincing identification strategies based on explicit randomization or careful analysis of nonexperimental variation. In some settings such as advertising, most studies have found small or zero effects. In others, such as face-to-face encouragement to vote or to give to charity, persuasion rates are consistently large.

A small body of evidence clarifies the mechanisms of persuasion, on both the supply and the demand side. The predictions of belief-based models with rational receivers clearly find support in the data. At least in some circumstances, receivers respond more when they are more uncertain and when messages are credible, senders are constrained by market forces to limit distortion, and increases in the supply of persuasive messages make markets more competitive. At the same time, there is also clear evidence of systematic departures from these models. Unsophisticated receivers neglect incentives, noninformative dimensions of messages affect behavior, and receivers take costly steps to avoid persuasive communication.

Testing these models is important in part because of their implications for welfare. The broad conclusion from theory is that welfare effects are more likely to be positive when persuasion functions as information and receivers are rational. The evidence in this survey suggests that the answer will depend on the setting and on the receiver: Small and large investors, for example, display quite different levels sophistication.

We see three especially important gaps in the existing literature. First, there is little evidence on the long-term effects of persuasion, which, for many questions, may be the most important horizon. The modern empirical literature has made great strides by exploiting both randomized and natural experiments, but these experiments often privilege the estimation of short-term effects. For example, of the 15 studies reviewed in **Table 1**, only four examine impacts over a horizon of a year or longer.

Second, few studies are designed to test directly models of persuasion. For example, there is limited evidence on how receivers take into account sender incentives or on how receivers seek information. Furthermore, most of the existing evidence provides qualitative, as opposed to quantitative, tests of the models, making it difficult to estimate precise economic and welfare implications. The discussion above suggests that stating results in a common metric such as the persuasion rate can resolve apparent inconsistencies across studies.

Third, some topics of great importance have been largely neglected. A first one is the role of competition. The proposition that competition among senders will limit the scope for distortion has played a central role in the way speech is regulated in many domains, with limited evidence to bear. A second one is the role of political persuasion in nondemocratic societies. Virtually all the evidence is from the United States or other democracies. Yet one of the original motivations for studying persuasion is its role in autocracies and dictatorships. On all these topics, more evidence is clearly needed.

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