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The Interplay between Public and Private Information in Asset Markets: Theoretical and Experimental Approaches

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FINMAP –

**FINANCIAL DISTORTIONS AND MACROECONOMIC
PERFORMANCE: EXPECTATIONS, CONSTRAINTS AND
INTERACTION OF AGENTS**

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TITLE

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by: Simone Alfarano, Eva Camacho, Marko Petrovic,
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ABSTRACT

In this paper we will give an overview of the more relevant results on the theoretical and experimental research related to public and private information dissemination and aggregation in asset markets, focusing mainly on the contemporaneous presence of public and private information and its effect on market performance. We conclude that the theoretical literature is more developed than the experimental one when dealing with public information and its role in different economic environments. Therefore, a promising research avenue opens for experimentally testing the different, and often contradictory, theoretical results.

JEL-Classification: C92, D82, G14

Keywords: Experiments, financial markets, private and public information, central bank information

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The Interplay between Public and Private Information in Asset Markets: Theoretical and Experimental Approaches

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Abstract

In this paper we will give an overview of the more relevant results on the theoretical and experimental research related to public and private information dissemination and aggregation in asset markets, focusing mainly on the contemporaneous presence of public and private information and its effect on market performance. We conclude that the theoretical literature is more developed than the experimental one when dealing with public information and its role in different economic environments. Therefore, a promising research avenue opens for experimentally testing the different, and often contradictory, theoretical results.

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1 Introduction

The idea that a price system based on competitive markets is able to aggregate different pieces of information dispersed in the economy dates back at least to Hayek (1945, 1948).

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A technical description about the feasibility of markets as efficient information aggregating institutions and the conditions under which this might take place is found in the theoretical literature of rational expectations.¹ The information role of prices is particularly important in capital and asset markets with respect to e.g. markets for perishable goods where prices reveal the present relative scarcity of the traded good. In particular, economists have long understood that, in theory, the prices in properly designed asset markets reflect the collection of all the information possessed by traders on future events. Asymmetry of information among the traders is of course an essential ingredient for prices to have an informational role. The logic of arbitrage suggests that when the informed traders move to take advantage of their information, the price will move by an amount in the direction that eliminates the advantage. Neutral observers of such a market would observe an association between the unanticipated information obtained by the informed traders and the consequent movement of market prices. The idea that prices promptly and unbiasedly adjust to reflect information came to be labeled as the efficient market theory (see Fama (1970)).

A full understating of the operational development of theory, the exploration of possibilities that real markets present and the testing of various market architectures that might support information aggregation are strictly the product of experimental economics (e.g. Kleidon (1995); Sunder (1995)) on the one hand, and of computational studies (e.g. LeBaron (2000)) on the other one. Empirical studies, in fact, are based on a partial control of the information set available to the traders. Experimental studies on the informational efficiency of asset markets have shown that the transmission and the aggregation of diverse information of individual traders depends on the market's architecture, on the information distribution and common knowledge, on the experience and rationality of traders, on the number and nature of traded assets. Moreover, while theoretical models focus on transaction prices as a vehicle for information transmission in markets, experiments reveal the presence and importance of other parallel channel of communication such as bids and asks, identity of traders, timing, and so on. In particular, a rational expectation equilibrium represents a good approximation of what is actually observed in experimental markets if some of the subjects know the true state with certainty, while the remainders are uninformed. As subjects are allowed to observe noise private signals, a convergence towards a full-revelation equilibrium occur relatively slowly (as agents learn to update their

¹See Grossman (1989) for a review.

trading strategies), and during its early phases the market can be affected by bubbles and crashes. The dissemination of private information is facilitated if agents have some knowledge of the market structure, of the preferences and beliefs of the other traders, and of the stochastic process generating the payoffs. Although the proof that properly designed markets can aggregate information has existed in the experimental literature, it is also proved that markets can exhibit patterns that are not fully revealing of information. This is the case of several observed phenomena in asset markets, such as cascades (Anderson and Holt (1997); Hung and Plott (2001)), mirages (Camerer and Weigelt (1991)), or price bubbles and crashes (Smith et al. (1988); King et al. (1993); Lei et al. (2001)).

Instead of leaving the market operating alone in aggregating private information, the release of public information might constitute an option that can facilitate the aggregation process. In addition to the information held privately by traders, one might assume the existence of a *disciplining* institution that releases public information in order to enhance information market efficiency. The public character of the information lies in the fact that it is known by all economic agents operating in the market.

Intuitively, one might think that public information should be beneficial for market performance (measured, for instance, as the degree of efficiency or the level of social welfare), if it is assumed that it simply *cumulates* to the information already present in the market: in this sense, at a first glance more information seems to be better. However, it has been shown in the literature that in the presence of an imperfect public signal, in particular environments or market conditions, such straightforward conclusion might not hold. Noisy public information, in fact, can interfere with the private information, with expectations formation mechanism or with traders' activity in the market. Several papers show that the presence of public information in a market, in general, and in a financial market, in particular, can create complex interactions with different market elements, resulting in potentially detrimental effects on market performance.

In this respect, Morris and Shin (2002) have shown that in a game-theoretical beauty contest, the contemporaneous presence of decentralized and centralized sources of information leads to a partial substitution of private information in favor of public information rather than the cumulative use of both sources. Within this model, they demonstrate that public information can be considered a double edged-instrument, i.e. it can convey information on the fundamentals of a financial asset, but, at the same time, it serves as a focal point in coordinating the traders' expectations. They concluded that the noisiness of

public information can be enhanced in the market due to the overreaction of the traders' expectations to the disclosure of a public signal. In particular, they their theoretical framework to explain the possible over-reaction of traders on central bank's announcements in setting the monetary policy. However, their framework can be easily extended to include other institutions releasing public information such as rating agencies, the IMF, the World Bank, etc. Considering the seminal contribution of Morris and Shin, it is of crucial importance to study the role that regulatory financial institutions play in the stability of the economic system: how they affect the traders' expectations and their effort in gathering information, as well as the weight traders give to the information released by such public institutions. Moreover, the double edged nature of public information poses the question of the degree of transparency chosen by a public institution when making public announcements. Additionally, the trust of traders on such public institutions is of central importance, and how it can also be enhanced or eroded.

This paper aims at giving an overview of the more relevant results on the theoretical and experimental research on public and private information aggregation and dissemination in asset markets, focusing mainly on the complex interplay between the centralized and decentralized information sources on market performance. The paper is organized as follows: in sections 2 and 3 we will introduce the main theoretical and experimental findings on public and private information aggregation and dissemination in asset markets. We summarize several contributions describing the basic framework and their main findings. Finally, section 4 includes some concluding remarks.

2 Theoretical Results

Under the efficient market hypothesis, states that, all *given* information will be correctly incorporated into market prices. However, when including into this picture the activity of traders in gathering costly information, Grossman and Stiglitz (1980) show the "impossibility" of existence of an equilibrium with fully efficient markets. Their model is an extension of the noisy rational expectations framework introduced by Lucas (1972) and applied to the study of information flows among traders by Green (1973). The main result is the famous paradox: if prices perfectly (and instantaneously) reflect all available information of privately informed individuals, under costly information production, there is no incentive for traders to afford the cost of being informed; on the other hand, if no

trader produces information, there is no information to be reflected in the price, in the first place. After Grossman and Stiglitz (1980) seminal paper, other scholars generalize their setting including more sophisticated market environments (see Diamond (1985)).

In our paper we are particularly interested in the interplay between public and private information and its effect on market performance. In this respect, Morris and Shin (2002) seminal paper constitutes an important reference in the theoretical literature on this topic. They consider public information as a double edged-instrument, i.e. it can convey information on the fundamentals of a financial asset, but, at the same time, it serves as a focal point in coordinating the traders' activity. Their model is based on a game that induces strategic behavior in the spirit of the Keynes' "beauty contest". They consider agents with access to public and private information on the underlying fundamentals. Agents have a coordination motive arising from a strategic complementarity in their actions. Namely, an agent's pay-off depends on the distance between his own action and the actions of others. The smaller is the distance, the greater is the pay-off. Hence, this brings a coordination motive.

They find that welfare is always increasing in the precision of the private information. However the precision of the public signal affects welfare ambiguously. When the private information of the agents is not very precise the improving precision of public information is beneficial. Contrary, if agents possess very precise private information then any increase in the precision of the public information will be harmful. There are two main elements in the theoretical framework proposed by Morris and Shin: (i) the conditions under which the release of public information produces a welfare loss, (ii) possible solutions to smooth the effect that noisy public information has on market volatility, given the over-reliance of traders on public announcements.

Based on the seminal papers of Grossman and Stiglitz (1980) and Morris and Shin (2002), some other studies have been developed dealing with different features of public information such as transparency (Angeletos and Pavan (2004) and Kool et al. (2011)), publicity (Cornand and Heinemann (2008)) or precision (Amato and Shin (2004), Svensson (2005)) and ambiguity Colombo and Femminis (2008)), its interaction with private information and its in effect in different economic environments.

In the next section we include a summary of important contributions to this literature with a short description of the theoretical framework and the main results.

2.1 Theoretical Contributions

Optimal Release of Information by Firms

Authors (year of publication): Diamond (1985)

Model: A general equilibrium model with rational expectation formation and risk aversion is presented in order to study the effects of the release of new information by firms within the theoretical framework of Grossman and Stiglitz (1980). The model follows the assumption of a pure exchange economy, so the information cannot influence the production decisions of firms.

Major finding: The main model's prediction is that the disclosure of new information by firms make all shareholders better off than a policy of no disclosure, due to information cost savings and improved risk sharing. On the other hand, individual welfare can be improved, given the decisions of other traders, by acquiring private information, but collectively they are worse off with the private acquisition.

Social Learning and Costly Information Acquisition

Authors (year of publication): Burguet and Vives (2000)

Model: A costly information acquisition is introduced in a standard, smooth social learning model with information externalities. In the model, short-lived agents aspire to predict a random variable θ (the quality of a product) by allocating some effort in order to acquire private information, and also by observing public information which is a noisy average of past aggregate sales of the good.

Major finding: There is scope for public intervention to subsidize private information acquisition. The market, typically, does not provide enough incentives for agents to acquire information. Moreover, in some instances introducing noise into public prior information may increase welfare.

Transparency of Information and Coordination in Economies with Investment Complementarities

Authors (year of publication): Angeletos and Pavan (2004)

Model: They introduce a simple real economy model where the individual return to investment is increasing in the aggregate level of investment and where market participants have heterogeneous expectations about the underlying economic fundamentals (the exogenous productivity). The model enables to study the effects of an increase in the transparency of public information.

Major finding: More transparency in public information, by permitting more effective coordination in the market, necessarily increases welfare, despite the fact that it may lead to higher volatility.

Public and Private Information in Monetary Policy Models

Authors (year of publication): Amato and Shin (2004)

Model: A macroeconomic model with public and private information and strategic complementarities in price-setting. Firms receive noisy private and public signals of current shock, while households and central bank have perfect knowledge of the shock.

Major finding: The strategic complementarity and precision of public information i.e. disclosure by central banks, has a big impact on monetary policy. Improved precision of public information may give rise to more volatile economic outcomes. Since disclosures by central banks are considered as important source of public information, the results shade some light on the debate on central bank transparency.

Social Value of Public Information: Morris and Shin (2002) is actually pro transparency, not con

Authors (year of publication): Svensson (2005)

Model: The aim of the paper is to challenge the anti-transparency result by Morris and Shin (2002) in their original model (without any extensions). That is: more public information can be bad for social welfare, hence central banks should exercise caution in how much information they reveal.

Major findings: The main findings are: (i) for reasonable parameters, social welfare is increasing in transparency in the Morris and Shin (2002) model. Specifically, if each agent does not give more weight to the beauty contest than to the fundamentals-related utility component, social welfare is increasing in transparency (ii) under the conservative hypothesis of equal precision of the public and private signals, social welfare is higher than in the absence of public information.

Imperfect Common Knowledge and the Information Value of Prices

Authors (year of publication): Amato and Shin (2006)

Model: This paper studies a New Keynesian model with a monopolistic competition setting.

Major finding: Public information has an unequal effect on agents' decisions e.g. crowds out private information, and thus has the potential to degrade the information value of prices. This effect is strongest in an economy with sharp price competition.

The Social Value of Public Information with Costly Information Acquisition

Authors (year of publication): Colombo and Femminis (2008)

Model: The beauty contest model studied in Morris and Shin (2002) is employed. The model assumes that private agents choose the precision of their private information after observing the precision of public information set by a public authority. In their model, both public and private information are endogenous.

Major finding: More precise public information increases welfare whenever its marginal cost does not exceed that of private information.

Optimal Degree of Public Information Dissemination

Authors (year of publication): Cornand and Heinemann (2008)

Model: The model framework is based on Morris and Shin (2002), which assume that

public announcements are received by all agents and the information provider can only choose the precision of public signals. In the model presented, the information provider can also choose the degree of publicity (modeled by the fraction of agents who receive a signal). Two schemes of providing information are allowed: public signals may be released to a predetermined group of agents or to each agent with some probability.

Major finding: The model shows that public information should always be provided with maximum precision. Under the hypothesis of announcements of low precision, partial publicity should only be employed in order to reduce the incentives to exaggerate the weight on public signals, preventing the negative welfare effect. The reason is that if this information is imprecise, agents coordinate with a large probability on a state that differs substantially from fundamentals. Eventually, the optimal degree of publicity is increasing if the public signal is sufficiently more precise than private information.

Central Bank Transparency and the Crowding Out of Private Information in Financial Markets

Authors (year of publication): Kool et al. (2011)

Model: Rational expectation asset market model based on Diamond (1985) with costly information acquisition is used. A key feature is that traders use market price to learn about other traders private information.

Major finding: For intermediate levels of public signal precision, private information is crowded out, resulting in higher forecast error variance. Only when public signal precision is either very high or very low, the central bank should be completely transparent. Furthermore, crowding out effect can occur when public information is more precise than private information, especially under the plausible circumstance that traders are nearly risk neutral.

The Benefit of Mixing Private Noise into Public Information in Beauty Contest Games

Authors (year of publication): Arato and Nakamura (2011)

Model: The model of Morris and Shin (2002) is extended by allowing the authorities to make an ambiguous announcement.

Major finding: Mixing private noise into public information is often socially beneficial. The authors point that: (i) for a given level of ambiguity, it may be better not to release information, and (ii) if ambiguity can be chosen freely, it is optimal to release the most precise information, but with an appropriate degree of ambiguity.

The Effects of Public Information with Asymmetrically Informed Short-Horizon Investors

Authors (year of publication): Chen et al. (2014)

Model: A two-period noisy rational expectations model with short-horizon investors, similar to those in Allen et al. (2006), is used. The model is populated by asymmetrically informed short-horizon investors with different levels of private information precision as well as the perfect competition trading is assumed.

Major finding: Information asymmetry reduces price informativeness and can lead to a multiple linear equilibria. Public information improves price informativeness only when it is of high quality. When the quality of public information is low, multiple equilibria can arise and increasing public information quality can reduce price informativeness.

3 Experimental Findings

In this section we summarize the main findings of the experimental literature on information aggregation and dissemination on asset markets. We can categorize previous studies on financial markets in a laboratory into two broad groups, on the one hand those studies where information is exogenously given to the traders at no cost. On the other hand, those settings where the information present in the market is endogenous, that is, there exists a market for information that runs parallel to the asset market. See Plott (2002) and Sunder (1995) for a thoughtful survey on experimental asset markets.

As a representative example of the first category, we can mention the seminal paper

of Plott and Sunder (1982) that analyses under which conditions *perfect* information is efficiently incorporated into prices. They address the issue of dissemination of information from a group of fully informed agents (i.e. insiders) to a group of uninformed agents and conclude that with replication and experience (even uninformed) traders are able to decipher the true state of the world by simply observing market price. Watts (1993) replicates the Plott and Sunder's experiments where the presence of insiders is random, and finds that the price convergence to the rational expectations equilibrium worsens. The review of different experimental studies on information aggregation and dissemination in a setting where *imperfect* information is distributed at no cost suggests that aggregation depends crucially on market features such as common knowledge, information distribution or subjects' experience. One important finding is that, even under the best circumstances, information aggregation and/or dissemination (when occurs) is not instantaneous, since traders need some time to observe the market activity, form conjectures, test them and modify their strategies. Therefore, there is an incentive for costly information creation due to the noisy revelation of information in asset markets as demonstrated in the experimental literature.

As an example of the second category is the paper of Sunder (1992), who consider the contemporaneous presence of an information market and an asset market inspired by the theoretical model of Grossman and Stiglitz (1980). In a first setting, the price of information is endogenous whereas the number of perfectly informed traders is fixed (i.e. a given number of perfect signal where auctioned off). In a second experimental setting, the price of information is fixed, whereas the number of informed traders is endogenous (and not known by traders). A series of experimental studies using different settings inspired by Sunder (1992) conclude that when the distribution of (perfectly) informed traders is not common knowledge in the market, it is harder for the prices to reveal information. See Copeland and Friedman (1991, 1992) or Camerer and Weigelt (1991), among others.

However, in all the previous experiments informed subjects are *insiders*, since the information received is always perfect or certain. Within this framework Hey and Morone (2004) develop a very simple experimental setting where heterogeneous and imperfectly informed agents have to trade a risky asset whose dividend depends on two equiprobable states of the world. In their setting, each trader can buy, at any moment during the trading period, as many signals as (s)he wants. Their results suggest that the aggregation process improves when the quality and quantity of information in the market are higher.

So far the experimental literature mainly focuses on the problem of market efficiency in aggregating private information into prices. Whereas, only recently it has been experimentally investigated the impact of a public signal on information aggregation and costly information production as in Ferri and Morone (2008) and Alfarano et al. (2014), the only two works to our knowledge dealing with this issue.

In the next section we include a summary of the most relevant papers included in this literature with a description of the main elements of the experimental setting and the most important results.

3.1 Experimental Contributions

Efficiency of Experimental Security Markets with Insider Information: An Application of Rational-Expectations Models

Authors (year of publication): Plott and Sunder (1982)

Experimental design: Five markets are created in a laboratory environment in order to explore some theoretical implications of insider information. The markets are organized as double auctions where a one-period-lived asset is traded. The asset pays a single dividend to its holder at the end of the period. The dividend from holding an asset differs across individuals and depends upon the state of the nature and agents' types. There are three agents' types in each market and two or three different states. Some agents (insiders) are given perfect information about the state of nature before the auction starts. Two theoretical models were used as a benchmark: (i) rational expectations equilibria and (ii) prior-information equilibria.

Major finding: With replication of market conditions the predictions of a fully revealing rational-expectations model are relatively accurate. Prices adjusted immediately to near rational-expectations prices; profits of insiders were virtually indistinguishable from non-insiders; and efficiency levels converged to near 100%.

Information Mirages in Experimental Asset Markets

Authors (year of publication): Camerer and Weigelt (1991)

Experimental design: The market is populated by 12 traders divided into 3 types. At

the beginning of each trading period, agents are endowed with 10,000 francs and 2 (one-period lived) assets. Traders could hold or trade their assets in a double auction. The dividends depend on the random state of nature and are different per trader type. There are two equally likely states of the world: G (Good) and B (Bad). At the beginning of each trading period: (i) the state of the world and the number of insiders are randomly determined (in some sessions it is equally likely to be 0, 3 and 6 traders, while in other sessions there is an equal probability that there are no insiders and half traders are insiders) and (ii) all the traders receive a private signal: Insiders (if exist) get a G or B card stating the real state of the world, whereas the remaining traders get a N card with no information.

Major finding: Restricting insider trading inhibits the ability of uninformed traders to detect whether there are insiders or not. While reducing volatility when there are insiders, these restrictions may cause more “mirages” when there are no insiders, which is certainly undesirable if prices are supposed to reflect information.

Partial Revelation of Information in Experimental Asset Markets

Authors (year of publication): Copeland and Friedman (1991)

Experimental design: Using a double auction as trading institution. Each subject is initially endowed with 20 cash and three assets per trading period. Three traders are randomly assigned to each of three payout schedules. Each payment schedule has two possible payouts: good or bad. At the beginning of each of the trading period, each subject was informed that there is a 50% probability for each of two possible payouts that period and receive (sequentially or simultaneously, depending on the treatment) during the auction costless information on the payout to be applied (good or bad). In another treatment information is auctioned before the asset trading starts.

Major finding: A parametric model of partial revelation is introduced in order to predict the price and the allocation of purchased information, providing the best fit to the experimental data compared to the alternative models of no and full revelation of information. Informational mirages (see Camerer and Weigelt (1991)) are observed. If traders rationally attempt to extract information from imperfect market signals, then it seems likely that they will sometimes be misled.

Market for Information: Experimental Evidence

Authors (year of publication): Sunder (1992)

Experimental design: The aim of the experiment is to analyze the simultaneous equilibrium in both the asset and the information markets. At the beginning of each trading period, subjects are endowed with cash and (one-period leaved) assets. The setting of asset markets is similar to Plott and Sunder (1982) but includes an information market where perfect private information offered to the traders prior to the asset market. In some markets the number of informed traders is known (supply of information is fixed and it is auctioned off), whereas in some other sessions the price for information is fixed and public but not the number of traders purchasing information.

Major finding: The results show that asset prices and the distribution of profits across traders converge to Rational Expectations Equilibrium predictions, as well as the allocation of information and assets, while the price of information tends to zero. Nevertheless, the above-mentioned observable aspects of market behavior indicate a lower informativeness in those markets where the number of informed traders is not common knowledge.

The Market Value of Information: Some Experimental Results

Authors (year of publication): Copeland and Friedman (1992)

Experimental design: The asset market is set as a continuous-time double auction. The information market is organized as a uniform price sealed bid auction. The number of the buyers is not revealed, while the market price of the information is revealed. At the beginning of each trading period, traders are endowed with 20 units of capital and 3 securities. There are two equally likely states of the world: Good and Bad. The dividends depend on both the random state of nature and the type of trader.

Major finding: Fully revealing rational expectations correctly forecasts that the market value of information approaches zero in simple environments with homogeneous states of nature, but non-revealing rational expectations rather accurately predicts the price and allocation of purchased information as well as trading profits in more complex environ-

ments with heterogeneous states of nature.

Do Markets Drive out Lemmings or Vice Versa?

Authors (year of publication): Hey and Morone (2004)

Experimental design: A single-unit double auction with 15 agents, 10 units of assets with equal probability of a positive dividend of 10 experimental currency units (ECU) or zero. The agents can buy an arbitrary amount of signals at any time during the trading period with a cost c per unit. The signal is partially informative and has a probability p of being correct. The agents are informed on the distribution of dividend values, c and the probability p . They perform 4 different treatments corresponding to the four possible combinations of two values for the cost c ($c=4\text{ECU}$ and $c=6\text{ECU}$) and two value pairs for p and q ($p=0.6$ and $p=0.8$).

Major finding: The results support that the mean price generally converges to the fundamental value, with a more marked tendency in the presence of a more informative signal (higher value of p) (ii) the price volatility is lower (with the implication that herding is less likely) when the quality and quantity of information in the market are higher. In the experiment the quality of information is exogenous (it is described by the parameter p), while the quantity of information (the number of signals purchased) seems to depend on the cost and noisiness of signals and on the behavior of the other agents. Therefore, the authors argue that a high quantity and quality of information may reasonably lead to fewer herds.

The Effect of Rating Agencies on Herd Behaviour

Authors (year of publication): Ferri and Morone (2008)

Experimental design: The objective of the experiment is to test the hypothesis that the introduction of a rating agency (public information) can stimulate the aggregation of private information. They conduct an experiment based on Hey and Morone (2004), but subjects observe in some treatments a costless public signal prior to the starting of the asset and private information market that will be correct with probability P . Both signals are partially but not totally informative on the true state of the world. They conduct

different treatment combining different precision of private information ($p = 0.55$ and $p = 0.65$) and public information ($P = 0.75$, $P = 0.80$ and $P = 0.85$).

Major finding: Their main hypotheses was that the release of public information in this market will generate significant positive effects on: (i) the reduction of price volatility (with the implication that herding is less likely) (ii) the price convergence to the fundamental value. Both hypotheses are not rejected. They find that as the public information becomes more precise (a higher value of P), the probability of herding is lower and the price convergence is faster.

Measuring the Impact of Information Aggregation Mechanisms: An Experimental Investigation

Authors (year of publication): Bennouri et al. (2011)

Experimental design: Sealed-bid multi-unit auction for a common value asset are performed with three different treatments: simple auction treatment (SA), cheap-talk treatment (CT) and market-based treatment (MB). At the beginning of each round the subjects receive a partially informative private signal about the value of the asset A, then they take part in the information aggregation mechanism (in the case of CT and MB treatments) and eventually make their bid. In the second part of each round, they observe a public signal, which is the sum of subjects' private signals, and afterwards they bid again for asset A. At the end of the second auction the price and the allocation for both auctions are revealed, but only one is randomly chosen in order to calculate the payoffs.

Major finding: The subsequent bidding shows that market-based information aggregation mechanisms aggregate information effectively, whereas cheap-talk information aggregation mechanisms do not transmit information.

Measuring Agents' Reaction to Private and Public Information in Games with Strategic Complementarities

Authors (year of publication): Cornand and Heinemann (2014)

Experimental design: The aim of the experiment is to investigate agents' reactions to

public and private signals. A two-player game with strategic complementarities is implemented with public and private signals. The experiment consists of 4 stages with a total of 50 periods. In stage 1 ($r = 0$) each subject has to decide on an action conditional on her private signal about the fundamental state, which is independent on their partners' choices. In stage 2 ($r = 1$) subjects should coordinate their actions independently on the fundamental state. The stage 3 contains three different treatments $r = 0.5$, $r = 0.25$ and $r = 0.75$. Despite the previous stages, the third stage includes both a fundamental and a coordination motive. In stage 4 subjects declare their expectations on the fundamental state and their partner's expectation of the fundamental state. After each period, subjects are informed about the true state, their partner decision and their payoff.

Major findings: Subjects attribute larger weights to public than to private signals if they have incentives to coordinate their actions. Moreover, the agents put higher weights on the public signal if the relative importance of the coordination component (r) is increased.

The Role of Public and Private Information in a Laboratory Financial Market

Authors (year of publication): Alfarano et al. (2014)

Experimental design: Using an experimental design similar to Hey and Morone (2004) and Ferri and Morone (2008), they conduct treatments only with private information and with public and private information. They conduct different treatments using different precision for private and public information. In those treatment with just private information the precision was either $p = 0.6$ or $p = 0.8$. In those treatments with public information, a public signal with precision $P = 0.8$ is introduced.

Major findings: They show that the release of public information reduces the traders' information demand. It keeps constant market informativeness, but significantly reduces price efficiency in aggregating information. In particular they observe that traders overweight public information that dominates the market dynamics.

4 Concluding Remarks

Our analysis on the current state of the art of the theoretical and experimental literature on aggregation of information into prices can be summarized in some important remarks: laboratory experiments have demonstrated to be a very useful method to test some of the predictions derived from theoretical models. In addition, the experiments helped to identify those situations where information is or is not aggregated into prices. Note that the theoretical literature in this particular field seems to lead with respect to the experimental contribution. In fact, the experimental research on introduction of (imperfect) public information in the experimental financial markets is somehow more recent, while the theoretical literature shows a much larger number of contributions. Despite this long list of theoretical contributions we have little agreement on whether the release of public information is beneficial or detrimental for the market performance or social welfare. For these two reasons, we can conclude our paper stating that experiments appear as a promising method to complement the theoretical analysis and discern among the alternative models.

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