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**Research Report**

## Designing public communication and disclosure strategies for central banks and other policy bodies

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# FinMaP-Policy Letter No. 6



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**FINMAP -**

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

**DATE: 12/21/2016**

**TITLE**

**DESIGNING PUBLIC COMMUNICATION AND DISCLOSURE STRATEGIES FOR CENTRAL BANKS AND OTHER POLICY BODIES**

by: Eva Camacho-Cuena and Simone Alfarano (Universitat Jaume I, Castellon)

The idea that a price system based on competitive markets is able to aggregate different pieces of information dispersed in the economy dates back to the 50's. 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.

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 market efficiency. The public character of the information lies in the fact that it is known by all economic agents operating in the market and it is almost freely available. Intuitively, one might think that public information should be beneficial for market performance, if it is assumed that it simply cumulates to the information already present in the market: in this sense, more information seems to be beneficial for decision makers. If this might be true when an economic agent acts in isolation from others, it might not be the case when a certain strategic interaction among decision makers is introduced. The theoretical literature has shown that in an economic system where agents have access to private information, noisy public information might be weighted above and beyond its accuracy, driving the economic system far from fundamentals when wrong and therefore damaging social welfare. Using the words of Morris and Shin (2002) "public and private information (might) end up being substitute rather than being cumulative". They demonstrate that public information might be considered a double edged-instrument: it conveys information on the fundamentals of a financial asset, but, at the same time, it serves as a focal point in coordinating the traders' activity in a market. As a consequence, the noisiness of public information can be enhanced in the market due to the overreaction of the traders to the disclosure of a public signal.

Public information overreliance has become a cause of concern to regulatory institutions. In this respect, the recent sub-prime crisis is a good example, if one takes into account the influence that the valuation of rating agencies had on the investors' decisions and their blind behavior in following what turned out to be a misleading advice. In fact, as part of the European Union conceptual framework to reduce reliance on external credit ratings, we find measures like the development of incentives to the market participants to develop their internal risk management capabilities. In this line, the CRA III Regulation includes a set of measures with the objective of strengthening own credit assessment by relevant actors and reduce the sole reliance on credit ratings.

However, the release of public information is not only related to the activity of credit rating agencies, but includes also regulatory institutions as central banks, specially within their forward guidance activity. In the recent years, central banks included in their research agenda the study of how public communications and disclosure policies affect agents' behaviour and incentives, wondering how can disclosure policies be designed to maximize their impact on desired forms of behavior, such as accurate pricing of risk and expectations of inflation.

Despite their relevance, the adverse effects of releasing public information are essentially conjectures derived out of simplistic theoretical models. The few existing experimental evidences are based on those models and, therefore, have limited external validity. Empirical evidence, instead, is highly anecdotal, since it is extremely difficult to monitor the traders' information in real markets. In order to study the effect of public communication and disclosure strategies of regulatory institutions we have conducted controlled laboratory experiments. We implement an asset market where traders can exchange a risky asset and an information market that provides noisy and costly private signals on the future value of the asset. We have clearly identified that:

- The release of public information reduces the investors' effort to gather private information, confirming the existence of a crowding out effect.

- Whereas public information helps the market efficiency when correct, when incorrect might drive asset prices far from the fundamentals, since it turns out to be a focal point for the market activity.

Our experimental setting can be used as a realistic testbed in order to assess the performance of different communication strategies. We test the effectiveness of two possible communication strategies to smooth the adverse effects of the release of public information, while preserving its positive effects:

- Public information transparency;
- Increasing the number of institutions releasing public information.

## EVIDENCE AND ANALYSIS

We have conducted controlled laboratory experiments on the aggregation of information into prices in a financial market in an environment where traders have access to costly and noisy private information and the regulatory institutions release costless public information (see the details of our experimental setting in section Research Parameters). Our main findings are:

- **Crowding out effect of public information:**

The release of public information crowds out the traders' acquisition of private information. Nevertheless, the reduction of private information is compensated by the information contained in the public signal. In our experiments, this crowding out effect results to be neutral for market informativeness, so that it does not alter the market potential to reach the fundamentals if all information is correctly aggregated in the market.

Figure 1 displays the boxplots<sup>1</sup> with the distribution of the demand for private information (Fig. 1a) and market informativeness (Fig. 1b). Market informativeness is measured as the distance between the expected price, given the information available in the market, and the true dividend value.

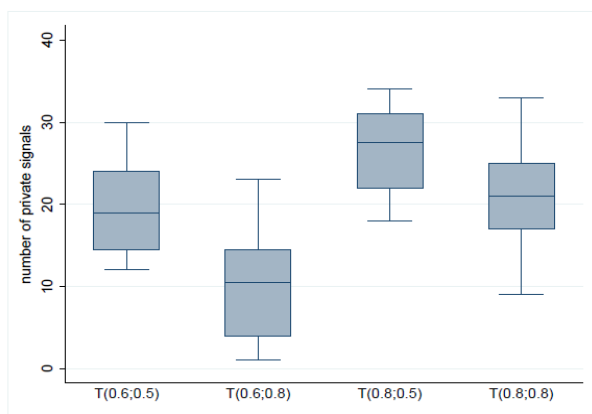


Fig.1a: Demand for private information

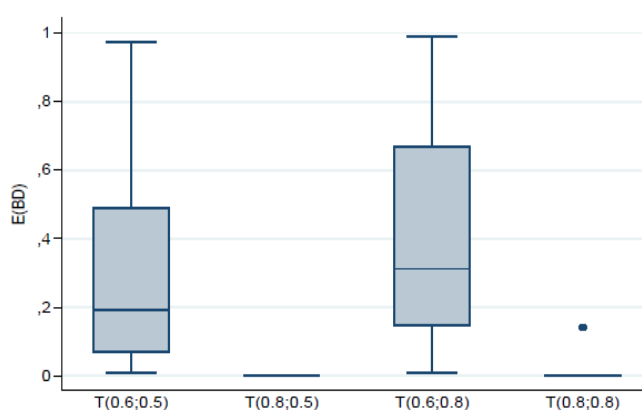


Fig.1b: Market informativeness

Figure 1: Private information demand and market informativeness comparing markets with and without public information: (i) markets without public information and with the access of private information with low (high) accuracy, denoted as  $T(0.6,0.5)$  ( $T(0.6,0.5)$ ) and (ii) markets where a single public signal is released and traders have access to low (high) accuracy private information, denoted as  $T(0.6,0.8)$  ( $T(0.6,0.8)$ )

- **Traders' overreliance on public information:**

Since the release of public information results to be neutral for the market potential to reach the fundamentals we would expect that it will not affect significantly market performance. Instead,

<sup>1</sup> Boxplot is a standardized graphical tool of displaying data distributions showing the range (maximum and minimum), the median, as well as the second and third quartiles.

when correct, public information helps to drive the market towards the fundamentals at a lower cost for the traders, since it reduces their incentives to collect costly private information. However, if incorrect it might drive market prices far from fundamentals.

To evaluate the market performance, we use the fully revealing benchmark (FR): the expected price conditional on all information present in the market being correctly aggregated in the market price. In order to measure whether the public information released constitutes a focal point in the market we compute the public information benchmark (PB) as the expected price conditional just on the value of the public signal. In the PB we assume that traders do consider the public information only. Figure 2 shows how public information is very effective in driving the market price, since the PB is better to describe market prices if public information is released into the market.

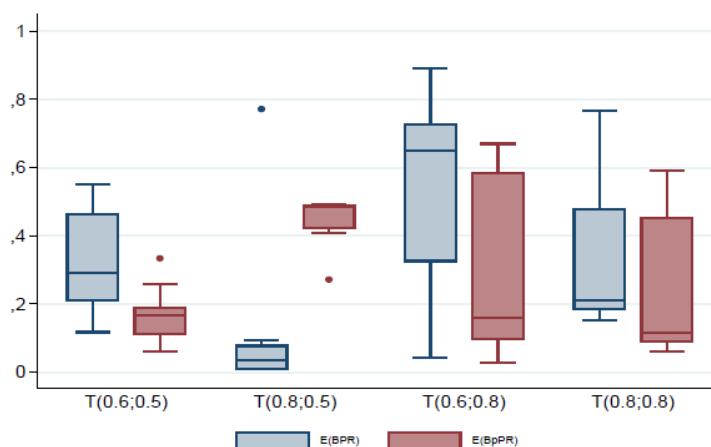


Figure 2: Absolute difference between the market price and the fully revealing benchmark [E(BPR)] and the public information benchmark [E(BpPR)] in markets with and without public information.

- **The common-knowledge nature of the public information is a crucial element for the traders' overreliance of public information:**

When the signal released by the public institution is common to all traders, but this is not common knowledge, the overreliance effect disappears. It is the common knowledge of the existence of a common signal the main responsible for its role as focal point in coordination the traders' behavior in the market.

One interesting characteristic of our results is that we identify and quantify the traders' overreliance of public information in an experimental asset market without any explicit coordination mechanism *à la* Morris and Shin. Figure 3 shows how eliminating the commonality of the public signal, the traders' overreliance on public information disappears independently on the precision of the public information available to traders. In this case public information results to be cumulative to the private information, instead of being substitute.

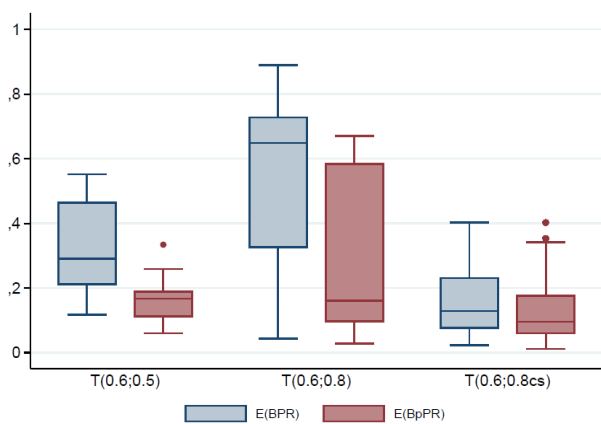


Fig. 3a: Low precision of private information

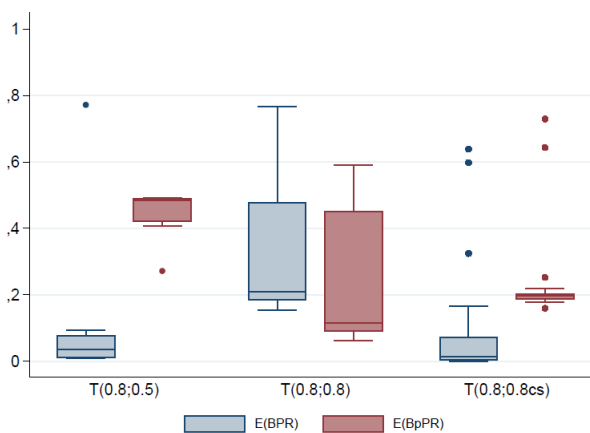


Fig. 3b: High precision of private information

Figure 3. Absolute difference between the market price and the fully revealing benchmark [E(BPR)] and the public information benchmark [E(BpPR)]. We compare three situations for different precisions of the traders' private information: (i) market with no public information [T(0.6;0.5) and T(0.8;0.5)], (ii) market with a public signal being common knowledge among traders [T(0.6;0.8) and T(0.8;0.8)] and (iii) market with a signal common to all traders but not common knowledge [T(0.6;0.8cs) and T(0.8;0.8cs)].

### Communication strategy

We have clearly identified in the common-knowledge nature of the public signal the main driver of the distorting effects, which backs up the intuition of Morris and Shin. The higher order expectations of the traders might create strategic incentives and, ultimately, potential distorting effects. In the following, we will propose and test the **effectiveness of different communication strategies** to smooth the adverse effects of the release of public information, while preserving its positive effects. In particular we focus attention on:

- **Reducing public information transparency:**

We define transparency as the accuracy of public information to predict the fundamentals. Figure 4 shows that releasing a public signal with lower precision might help enhancing price efficiency, smoothing the overreliance effect. When incorrect, then its effect as driving force for market prices is reduced, whereas aggregate price efficiency is improved.

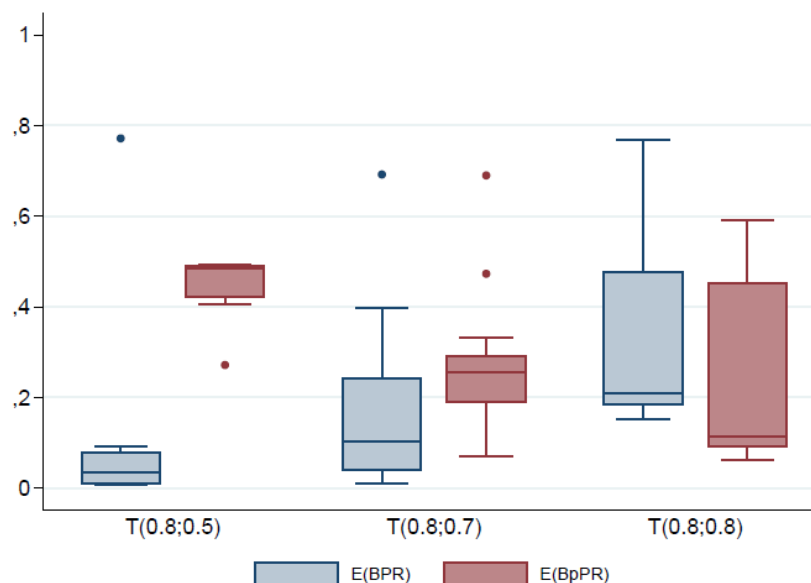


Figure 4: Absolute difference between the market price and the fully revealing benchmark [E(BPR)] and the public information benchmark [E(BpPR)]. We compare three situations for different precisions of the public information released: (i) market with no public information [T(0.8;0.5)], (ii) market with a public signal with low precision

[T(0.8;0.7)] and (iii) market with a public signal with high precision [T(0.8;0.8)].

- **Increasing the sources of public information:**

We test whether increasing the number of public signals, as proposed by the CRA III Regulation, is effective to strengthen traders' own credit risk assessment and reducing their reliance on public information and its potential adverse effects.

Figure 5 shows that the release of public information from two independent institutions provokes a crowding in effect in the information market, increasing the traders' demand for private information (Fig. 5a) and improving the market informativeness (Fig. 5b).

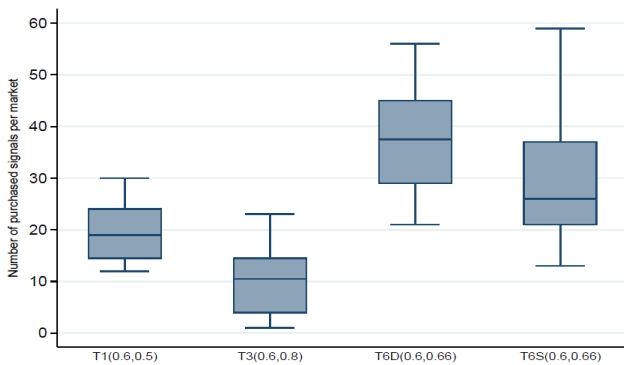


Fig. 5a: Demand for private information

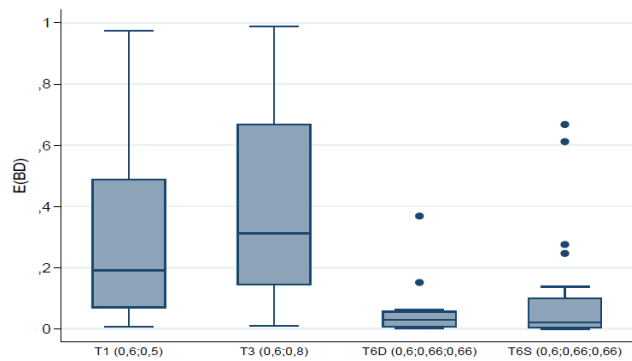


Fig. 5b: Market informativeness

Figure 5. Private information demand and market informativeness. We compare four different situations: (i) market without public information [T(0.6;0.5)], (ii) market with a single public signal [T(0.6;0.8)], (iii) market with two independent public signals that disagree [TD(0.6;0.66;0.66)] and (iii) market two independent public signals that agree [TS(0.6;0.66;0.66)].

However, whereas market informativeness is improved, this is not the case for the price efficiency, since we observe in Figure 6 that traders' overweighting of public information (underweighting of private information) is independent on the number of institutions releasing public information.

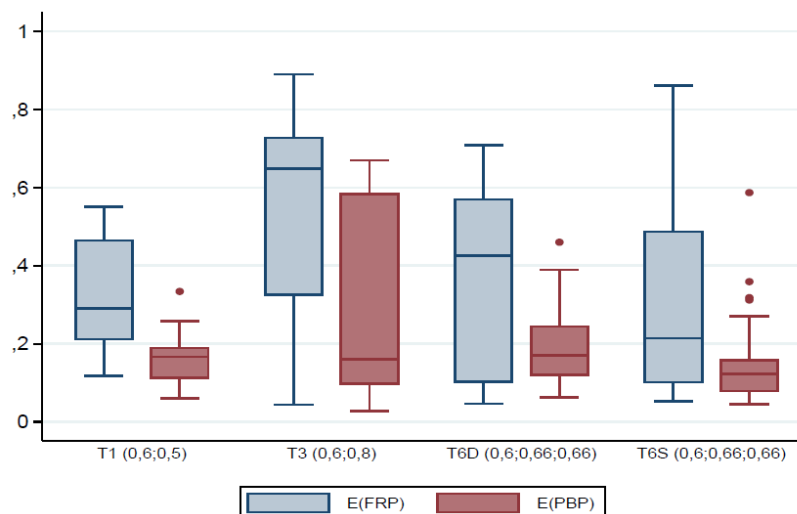


Figure 6: Absolute difference between the market price and the fully revealing benchmark  $E(BPR)$  and the public information benchmark  $E(BpPR)$

The objective of regulatory institutions when releasing public information is essentially to discipline the market, reducing the potential negative effects of asymmetric information. According to the theoretical literature, however, the release of public information might have adverse effects.

Using a simple laboratory financial market, we show that:

- crowding out of private information and overreliance on public information do exist;
- and turn out to be very relevant for the market performance.

Those effects emerge without inducing the traders to coordinate, as in other experimental studies reproducing the very specific Morris and Shin (2002) theoretical framework. We can infer, therefore, that:

- crowding out and overreliance are probably more phenomena general than conjectured by the theoretical literature.

Several policy implications can be derived out of our simple set of experiments:

- Policy makers should be aware that the release of public information might have distortive effects on the aggregation of information into prices.
- Those effects might be extremely significant as demonstrated by the role that credit rating agencies had on the spreading of the 2008 financial crisis.

Far from being against the presence of public institutions releasing information for regulating financial markets, we stress the unintended effects that the complex interaction between private and public information might generate.

As a policy advise we recommend that eventual reforms on the regulation of financial institutions (for instance the credit rating agencies) should account for the complex interplay between private and public information, that we have identified in our experiments and give incentives to the investors (institutional and/or private) to search for alternative sources of information. In order to take stock of the regulatory advantages of releasing of public information and smooth its potential adverse effects, we give some guidelines for the design public communication and disclosure strategies:

- More precise information does not necessarily help the market to align to the fundamentals, since public information does not cumulate but substitutes private information.
- It is not always optimal to reveal all available information, but it might be better to release an informative signal that it is not perceived as too precise by the investors to avoid overreliance. So, investors have more incentives to search for alternative sources of information.
- Increasing the number of institutions releasing public information is not a clear-cut solution to improve market efficiency. If it seems to enhance the investors' incentives to gather additional information, it is not guaranteed the improvement of market efficiency.
- In principle, the most effective measure that we have identified is *whispering in the ears of investors*: i.e. to spread a common information among investors without being common knowledge. However, we understand that this measure is not easy to implement.

Several other measures can be also tested, like a sequential release of public information, reducing the level of publicity, etc... We strongly believe that our laboratory setting can be used as a realistic testbed in order to assess the performance of different policy instruments, without relying on specific behavioural assumptions or/and *ad hoc* coordination mechanisms.

In order to study the effect of public communication and disclosure strategies of regulatory institutions we have conducted controlled laboratory experiments. We propose an experimental setting to observe the aggregation of information into prices in a simple financial market where



traders have access to costly and imperfect private information and a regulatory institution releases costless and public information. Controlled laboratory experiments have some advantages and disadvantages with respect to empirical and theoretical approaches. Among the advantages of laboratory experiments: (i) we have perfect control of the allocation of information among traders in the market, (ii) we can observe every single action of each trader in the market, and therefore (iii) we can, in principle, connect the information at the disposal of the traders with their individual actions in the market and the aggregate market performance. We can therefore test different market configurations and communication strategies on the information aggregation in the market through the trading activity. Among the disadvantages of laboratory experiments: (i) with respect to empirical research, we could find some problems of external validity of the experimental results, since we are not dealing with real traders in real conditions; (ii) with respect to theoretical models, we cannot perfectly specify the traders' expectation formation and trading behaviour.

### Experimental Design:

We consider markets populated by 15 subjects. Each session consists of 10 or 15 independent (3 minutes) trading periods where subjects can trade assets using a double auction. At the beginning of each trading period, each subject is endowed with 1000 units of experimental currency (ECU) and 10 units of an asset that pays a dividend  $D$  at the end of the trading period. Apart from the dividend paid out, assets are worthless. The value of the dividend will take the value 0 or 10 with a 50% probability. At the beginning of each trading period the true dividend is randomly determined by the experimenter, but not revealed to the subjects until the end, when the period payoff is determined. At any moment within a given trading period, subjects can purchase a private signal paying a cost of 4 ECU per signal. Additionally, only in those treatments with public information, subjects have free access to a public signal whose value is common knowledge among subjects. Such signal is made public before the trading period starts.

Both (private and public) signals are partially informative of the true dividend value, and are presented to the subjects taking the value 10 or 0. If a subject purchases a signal that results to be 10 (0), he can infer that the dividend is expected to be 10 (0) with probability  $p$  and 0 (10) with probability  $q = 1 - p$ . Following the same reasoning regarding the public signal, if a subject observes a public signal equal to 10 (0), he/she can infer that the asset dividend at the end of the trading period will be 10 (0) with probability  $P$  and 0 (10) with probability  $Q = 1 - P$ . Both, the value of  $p$  and  $P$  are common knowledge among subjects.

Table 1 shows the different treatments implemented depending on the accuracy for the private and public signals and different sources of public information:

Treatment	Prob. private signal correct ( $p$ )	Prob. public signal correct ( $P$ )	Number of markets
T(0.6; 0.5)	0.6	-	30
T(0.8; 0.5)	0.8	-	20
T(0.6; 0.8)	0.6	0.8	30
T(0.8; 0.8)	0.8	0.8	30
T(0.6; 0.8cs)	0.6	0.8	30
T(0.8; 0.8cs)	0.8	0.8	30
T(0.6; 0.66, 0.66)	0.6	0.66	35

Table 1. Treatments and parameters.

Treatments T(0.6; 0.5) and T(0.8; 0.5) constitute our baseline treatments. To evaluate the impact of the release of a single public signal of higher precision, we introduce treatments T(0.6; 0.8) and T(0.8; 0.8), where the quality of the public signal is at least as good as a single private signal. However, one should consider that each individual trader can buy several private signals in a way that his/her aggregate private information might be more accurate than the single public signal, since all private signals are independent realizations of a given distribution. Treatments T(0.6; 0.8cs) and T(0.8; 0.8cs) allow to test for the common-knowledge nature of public information, since in those treatments subjects receive a public signal, common to all subjects, but this is not public knowledge. Finally, treatment T(0.6; 0.66, 0.66) allows to introduce a situation where subjects have access to multiple independent sources of public information. Note that the prediction of the two independent signals about the true dividend value (correct with a 66% prob. each) could be either the same or

opposite: (i) If the two signals predict different values for the asset dividend, no additional public information is provided to the market. This case is equivalent to a situation where no public information is released. (ii) If the two signals predict the same value for the asset dividend, the public information released is equivalent to a single public signal with a prob. of 80% of being correct.

As an example, Figures 7a and 7b show the price dynamics in markets without public information and with public information, respectively. We can immediately observe how the price dynamics is affected by the release of public information in the market.

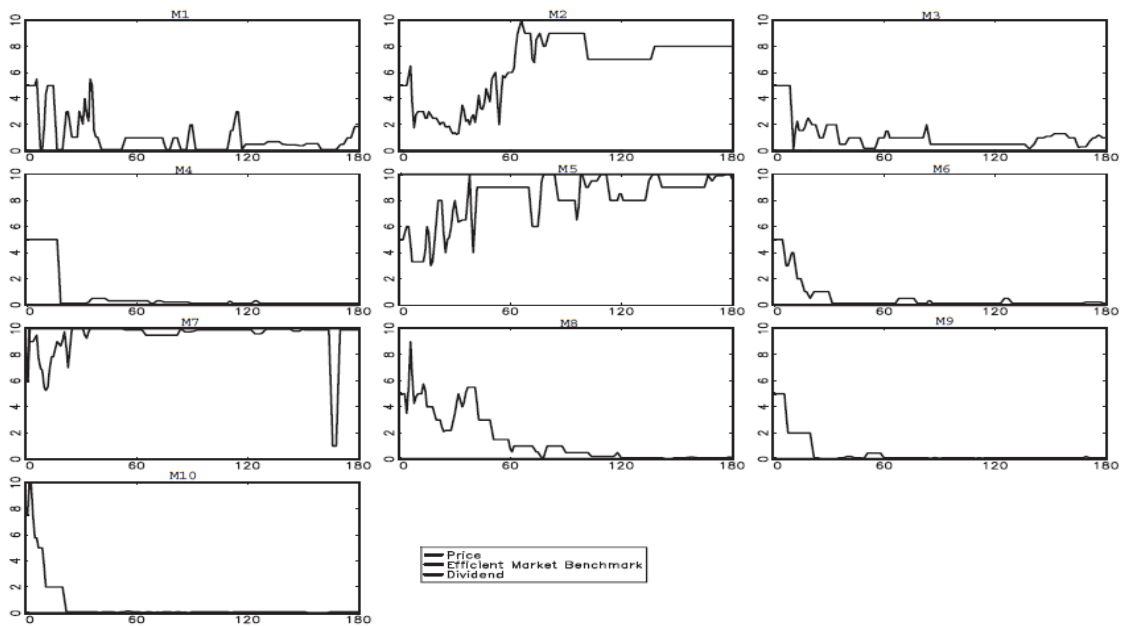


Figure 7a. Markets with no release of public information in treatment T(0.8; 0.5).

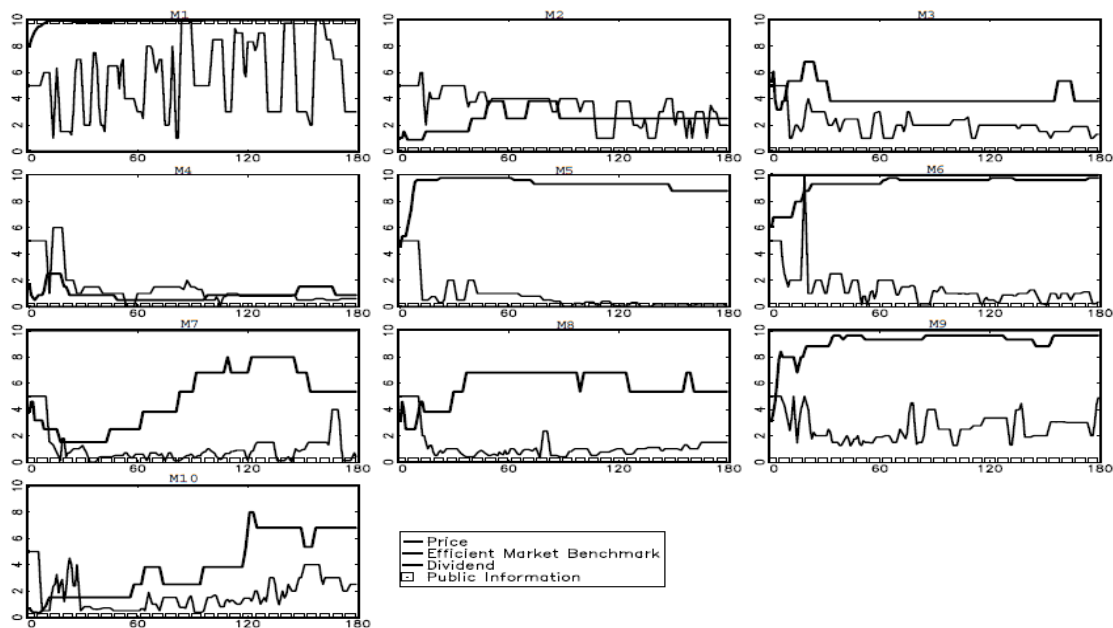


Figure 7b. Markets where public information is released in treatment T(0.8; 0.8).