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**INFORMATION MIRAGES AND FINANCIAL CONTAGION
IN ASSET MARKET EXPERIMENT**

By

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Information Mirages and Financial Contagion in Asset Market Experiment

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Abstract

We study financial contagion in an experimental market. There are two assets and an exogenous shock reduces the value of one of the two assets. Whether and how the other asset is affected depends on the correlation between the underlying values of the two assets. In some trials, the correlational relationship between the assets is unknown to all agents. In other trials, 50% of the traders are insiders who know the nature of the relationship between the assets. In periods with insiders, prices typically reveal private information. In periods without insiders, information mirages frequently occur, and can readily be interpreted as financial contagion that is unjustified by any underlying fundamental relationship. Our results suggest that under asymmetric information, traders may overreact to data from one market with their behavior in other markets.

Keywords: Experiment; Asset market; Financial contagion; Information mirage

JEL Classification Numbers: C91, D82, D53, G14.

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1 Introduction

The financial turmoil of 2007-2008 and the subsequent European sovereign-debt crisis have returned the topic of contagion and systematic risks in financial markets to center stage. Global financial integration appears to have increased the frequency of financial crises compared with the Bretton Woods and the gold standard periods [Bordo et al., 2001]. Furthermore, the correlation between price movements of different stocks (J.P. Morgan, 2012), as well as between different market indices (Junior and Franca [2012]), tends to increase after an adverse shock to the market. This cross-market correlation is often defined as financial contagion¹. Financial contagion is arguably one of the key driving forces that aggravates the spread of modern financial crises.

It is crucial to distinguish the component of the correlation between assets or indices that is justified by the interdependence of the fundamental values of the assets, from the additional correlation that arises as a result of behavioral factors, such as market overreaction, panic, or false beliefs about asset correlation. The former is a result of shock propagation through interrelated economic fundamentals.² The latter, which might be called behavioral contagion, can have a number of different causes. Self-fulfilling beliefs regarding what other market participants plan to do can generate a panic that results in coordination failure (Diamond and Dybvig [1983]). A shock to one asset can create a “wake-up call” effect [Goldstein, 1998] that causes investors to worry about their own economic outlook. Another possibility is imperfect information, in which at least some participants in the market are unsure about whether a shock in the price of one asset reveals relevant information about other assets.

This last possibility is modeled by King and Wadhwani [1990]. In their model, some market participants believe that price changes may contain valuable information regarding the fundamentals in other markets. Observed price changes are used to infer other traders’ information, sometimes incorrectly. Specifically, King and Wadhwani [1990] assume that

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¹Financial contagion has a number of different meanings in the literature (see Pericoli and Sbracia [2003]).

²For an overview, see page 162 of Moser [2003].

price movements for an asset may be driven by information that affects other assets, but that prices are also subject to idiosyncratic shocks. Suppose there are two markets, one trading asset A and the other trading asset B. The change in the asset market index between period t and $t - 1$ is a function of the information released between the two periods. The information is of two types, systemic (denoted by u) and idiosyncratic (denoted by v). Let ΔP_t^i denote the change of asset prices between period t and $t - 1$, and i index the market i ($=A$ or B). If information about both assets is fully revealed, then the process that generates changes in asset prices is:

$$\Delta P_t^A = u_t^A + \beta_1 u_t^B + v_t^A \quad (1)$$

$$\Delta P_t^B = \beta_2 u_t^A + u_t^B + v_t^B. \quad (2)$$

Under perfect information, a systemic shock (u_t^i) is transmitted across markets, while a specific shock (v_t^i) is not. Nevertheless, since information is not perfect, whenever participants in market A observe a shock to market B's price, they cannot distinguish whether the shock is a market-specific or a systemic shock that affects their own asset price. Financial contagion results from a mistaken inference that a change in the price of one asset reveals information that affects the values of other assets.³

The experiment that we report here considers whether asymmetric information about correlations between assets can induce financial contagion. This would arise if market participants overreact to uninformative trades, which actually convey no (valuable) information.

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³Kodres and Pritsker [2002] introduce a more comprehensive model that incorporates the idea of King and Wadhvani [1990], in which they explain financial contagion as a result of optimal portfolio rebalancing after a shock. They study the effect of asymmetric information arising from the presence of insiders. They show that the presence of insiders who know the true asset value after a shock makes a market more vulnerable to financial contagion. In their model, uninformed traders believe that buying or selling orders in a market reflects private information about that market, even though the order flow could be just for the purpose of optimally rebalancing portfolios across markets due to an idiosyncratic shock. But since uninformed traders cannot confidently exclude the possibility that price changes reflect valuable information, they adjust their limit prices accordingly. In the absence of asymmetric information, the effect of portfolio rebalancing is much smaller.

Such behavior would constitute a type of *information mirage* [Camerer and Weigelt, 1991], though the mirages [Camerer and Weigelt, 1991] observe consist of mispricing contained within one market, rather than contagion spilling over into other markets. It is a mirage because traders infer information from the trades that is not really there. We also consider whether the market accurately disseminates insider information about fundamental value correlations when such information is indeed present.

Our experimental markets allow participants to simultaneously trade two assets. Shocks can occur, which either have an idiosyncratic effect on the shocked asset, or a systematic effect on both assets. Half of the time, there exist insiders who know the true nature of the shock and how it affects the value of the non-shocked asset. The other half of the time, no agent knows whether there is a correlation between the assets. In such cases, there is the potential for the appearance of information mirages.

The results of the experiment show that when inside information about the nature of the correlation between assets exists, it is readily disseminated in the form of market prices. However, when there is no private information, mirages are common, demonstrating that financial contagion can arise in the absence of any fundamental relationship between assets. An analysis of individual behavior suggests that some unprofitable decisions are related to an aversion to complex distributions of lottery payoffs.

The paper is organized as follows. Section 2 describes the experimental design, hypotheses and experimental procedures. We present the results of the experiment in section 3. Section 4 contains a discussion and concluding remarks.

2 The Experiment

2.1 Experimental Design and Procedures

We study a two period setting similar to that of Forsythe et al. [1982] and Friedman et al. [1984]. In each experimental session, two double auction markets are operating simultane-

ously. In each market, one of two assets, A or B, can be traded. We refer to each two-period sequence as a round. Most sessions consist of ten rounds.

At the beginning of every first period of each round (each odd period), each subject is endowed with 5 units of asset A and 5 units of asset B. Subjects are also endowed with 20,000 francs (experimental currency) of working capital. The working capital is a loan that must be repaid at the end of the round. Subjects' endowments of asset and working capital are reinitialized at the beginning of each round.

The only source of intrinsic value for both assets is the dividends that they yield. Both assets pay stochastic dividends at the end of each period. The dividend is the same regardless of who owns the unit. Dividends are paid to a separate account that cannot be used for purchasing assets, but that does count toward final earnings.

In the *first period* of each round, the dividend of both assets is drawn independently from the set $\{100, 150, 350, 400\}$ with equal probability on each possible outcome. This makes the expected dividends for both assets equal to 250 in every first period in any round.

In the *second period* of each round, a shock occurs to either asset A or asset B with equal probability. All subjects are informed of which asset is shocked. If an asset is shocked, it can not pay the two highest dividend realizations (350 or 400) in the second period of the current round. This means the expected dividend that a shocked asset pays is 125 in the second period. In addition, when the shock occurs, asset A and asset B may be either positively correlated, negatively correlated or independent of each other, with equal probability. If an asset is positively correlated with the shocked asset, it cannot pay the highest possible dividend (400). If an asset is negatively correlated with the shocked asset, it cannot pay the lowest possible dividend (100). Hence, the expected dividend for an asset that is positively (negatively) correlated with the shocked asset is 200 (300) in the second period.

In each round, there is 50% chance that the computer will randomly select half of the subjects as insiders. The insiders know the exact relationship between the assets and thereby

Figure 1: Dividend Structure in Period 2

the true value of the assets in the second period of the current round⁴

Figure 7 summarizes all possible scenarios in the second period of any round. The same figure is shown to all subjects in the instructions, which also explain in detail how the numbers in the figure are calculated. Subjects are also explicitly told to refer to this graph whenever they need a reminder about the dividend process. The expected value of the non-shocked asset is 250, calculated as $\frac{1}{3}(200 + 250 + 300)$. The term $\frac{1}{3}$ comes from the fact that there is equal probability that the two assets are positively, negatively, or not correlated.

2.1.1 Creating a Choice List for Measuring Complex Lottery Aversion

As we describe later in section 3.4, our experiment generates an interesting and puzzling result that assets are consistently underpriced in odd periods, the first period of each round. Risk aversion cannot explain this pattern because risk averse agents would price the asset at a discount in both periods, not just the first period of a round. As another attempt to explain it, we administered a choice list to measure the degree of *complexity aversion* for each participant in the last three sessions of the eight that we conducted. Complexity aversion is

⁴Subjects are clearly told that the information they receive (if any) will be the same among the informed traders.

the degree to which an individual prefers a lottery with a simple payoff distribution relative to more complex one with the same mean, variance, and skew. Since the dividend process, shown in Figure 7, can be readily understood as a complex lottery with many possible outcomes, the more complexity averse a person is, the more likely it is that she will try to sell her assets in the first period of a round. This is because one of the main differences between the first and second periods is that the degree of complexity in the distribution of the asset's payoff is largely reduced in the second period, when all traders know which asset is shocked and some may know the underlying correlational relationship. If it is the case that complexity averse traders are more likely to sell the asset in the first period, than the greater the average level of complexity aversion among the traders in a session, the lower the prices should be in the first period of a round.

The protocol that we use to measure complexity aversion is abstract, with no market framing. Subjects choose between a relatively complex lottery with four possible payoffs and a simple binary lottery (all with graphical representations, see figure 2). We construct the complex lottery by taking the compound risk presented by the payoff distribution of the asset in the second period of a round, and then adding the expected dividend in the first period (250 francs) to it. We keep the complex lottery the same throughout the choice list, as shown in table 1.

Next, we construct a simple binary lottery with the feature that a complexity-neutral person would be indifferent between it and the complex lottery. The simple lottery is adapted from the complex lottery, controlling for expected value, variance, and skewness based on the method introduced by Ebert [2013]. Controlling for the first three moments of the two lotteries is especially important for our purposes, because we intend to isolate to what extent people are averse (or not) to complexity, rather than to variance or skewness.

We then monotonically vary the expected payoff of the simple binary lottery to complete the choice list such that, at some point, one option is clearly better/worse than the other on the list. Complexity averse (seeking) people would prefer the simple (complex) lottery in

Figure 2: An example of the items on the Choice List

some cases when the expected payoff of the simple (complex) lottery is lower than the other. Subjects were informed that exactly one of the decisions they made would count toward their final earnings. The number of simple lotteries chosen by decision makers is taken as a measure of complexity aversion⁵.

Table 1: The Choice List Measuring Complex Lottery Aversion

Decision Number	Option A (Simple Lottery)	Option B (Complex Lottery)
1	(.38, 425; .62, 283)	(.5, 375; .16, 450; .17, 500; .17, 550)
2	(.38, 445; .62, 303)	(.5, 375; .16, 450; .17, 500; .17, 550)
3	(.38, 465; .62, 323)	(.5, 375; .16, 450; .17, 500; .17, 550)
4	(.38, 485; .62, 343)	(.5, 375; .16, 450; .17, 500; .17, 550)
5	(.38, 505; .62, 363)	(.5, 375; .16, 450; .17, 500; .17, 550)
6	(.38, 525; .62, 383)	(.5, 375; .16, 450; .17, 500; .17, 550)
7	(.38, 545; .62, 403)	(.5, 375; .16, 450; .17, 500; .17, 550)
8	(.38, 565; .62, 423)	(.5, 375; .16, 450; .17, 500; .17, 550)
9	(.38, 585; .62, 443)	(.5, 375; .16, 450; .17, 500; .17, 550)
10	(.38, 605; .62, 463)	(.5, 375; .16, 450; .17, 500; .17, 550)

Note — (a,b; c,d; e,f; g,h): with probability “a” the lottery yields “b”. The rest of the prospects follow the same notation.

⁵Alternatively, the heterogeneity can also be measured by a switching point in the choice list. The earlier a person switches from choosing option B to option A in decisions 1 to 10, the more complex lottery averse she is. Because an individual may have more than one switching point, an additional criterion would need to be included to identify the switching point to be used as the complexity aversion measure.

2.1.2 Experimental Procedures

Eight sessions were conducted at the CenterLab facility at Tilburg University, in the Netherlands, between April 2013 and April 2014. In seven of the eight sessions, there were ten sequential rounds of two-period markets.⁶ The number of participants ranged from eight to fourteen per session, but always with an even number. Participants were students from variety of majors, who had no prior experience with this experiment. Trade was denominated in an experimental currency called *francs*. Subjects were paid by bank transfer in euro after the session. The exchange rate was 2,200 francs = 1 euro. The duration of sessions averaged about 2 hours and 20 minutes (including instruction and a short questionnaire). Average earnings were approximately 20 euro (\$ 26.68). The training period itself lasted about 45 minutes, including 2 trial market periods.

Each period lasted for 180 seconds, during which subjects were free to buy and sell both types of asset. Asset A and B were traded in separate markets, which were just one mouse-click away from each other. At the end of each period, a feedback screen was shown to all participants. In the first period of each round, the feedback screen informed the subjects of which asset would be shocked in the second period, together with dividend payment for the period, their current holdings of each asset, and their cash balance. Any insiders were informed about the relationship between the shocked asset and the other asset. After the second period had elapsed, subjects learned whether there were insiders in the market, the relationship between the two assets, and their earnings for the round. A subject's earnings for a round were equal to her earnings from dividends, plus the proceeds from her sales, minus her expenditures on the asset.

2.2 Models

Two models can be applied to the data. The first is the Rational Expectations (RE) model (Plott and Sunder [1982], [1988]; Copeland and Friedman [1987]). This model assumes that

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⁶The first session consisted of eight rounds.

market prices that fully reveal all private information [Camerer and Weigelt, 1991]. The second is the Private Information (PI) model, which assumes that prices reflect all public information but no privately held information.

The RE and PI models predict the same prices for the first period of a round. Since no one possesses inside information about the shock and correlation between assets, the market price for both assets is 437.5 francs, the unconditional mean of the two-period payoff distribution.⁷ In period 2, when insiders exist in the market, the RE and PI models predict a different price for the non-shocked asset.

Table 2 summaries the resulting prices, depending on whether insider information is revealed (RE) or not (PI). If prices fully reveal insider information, as under the RE model, the price would be 200 francs if the non-shocked asset were positively correlated with the shocked asset, 300 francs if it were negatively correlated, and 250 francs if uncorrelated. If no inside information is reflected in the asset price, as under PI, the asset would trade at 250 francs.

Table 2: Predicted Prices (in Francs) under Private Information and Rational Expectation Theories

Theory	No Information	Insider Information		
	(State N)	Positive	Negative	Independent
RE	250	200	300	250
PI	250	250	250	250

During period two, there is uncertainty about the existence of insiders. If some traders mistakenly believe that insiders exist in the market, they may extract erroneous signals from the prices. Market prices may come to reflect information that does not actually exist. This phenomenon has been termed an information mirage (Camerer and Weigelt [1991]).

An information mirage would presumably lead the price of the non-shocked asset to

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⁷This is calculated by adding up the expected dividends for the two periods. In period 1, the asset's expected dividend is 250 francs. In period 2, all possible situations are summarized in Figure 7. The expected dividend is $0.5 * 125 + 0.5 * (\frac{1}{3} * 200 + \frac{1}{3} * 300 + \frac{1}{3} * 250) = 187.5$ francs. Summing up the period 1 and period 2 expected dividends yields 437.5 (=250+187.5) francs.

move toward either 200 or 300 francs, corresponding to an imaginary positive or negative correlation. Operationally, we say that an information mirage occurs in a period if there are no insiders, and if prices are closer (measured by the mean squared error) to one of the mirage prices (200 or 300 francs) than to the no information level (250 francs). If an information mirage occurs, then at least one of the beta coefficients in equations (1) and (2) would be non-zero in the absence of inside information.

3 Experimental Results

3.1 Overview of Market Level Data

Figures 3 - 6 report the distribution of trading prices in our experiments. The RE and PI prices (the dashed lines) are calculated based on the information available in the market. In the first period of a given round, the RE price is always 437.5 francs. In every second period of the round, the shocked asset is worth 125 francs on average. The value of the non-shocked asset depends on the presence of inside information. If such information exists, then under the RE model prices reveal its value. The value is 250 francs in the absence of insiders.

Figure 3 displays the distribution of median trading prices in the first period of each round. We do not report assets A and B separately because (a) there is no material difference between the two assets in first periods and (b) in principle, subjects should treat the two assets equally in every first period as there is no way to know which asset will be shocked. The figure also reports the data from the first and second halves of the sessions separately. This allows any effect of experience to appear in the figure. Prices in the first periods are consistently lower than the RE/PI level. The difference is not reduced in the late periods of the sessions.

Figure 4 shows that in the second period of a round, the shocked asset prices are close to RE/PI levels. Consistency with the models increases as traders gain more experience.

Figure 5 shows the median trading prices in the second period when insiders exist. We

Figure 3: Distribution of First Period Median Transaction Price: Grouped by First and Second Halves of Sessions. Dashed line indicates the RE/PI price. Top (bottom) line is the upper (lower) adjacent value, which falls within 1.5 IQR (Interquartile range). The IQR is represented by the length of the shaded box. The upper (lower) hinge of the box represents 75% (25%) percentile. The median is represented by a line subdividing the box. Outliers are represented by dots, which exceed the range of 1.5 IQR. The above descriptions are omitted in the box plots below because they are drawn with the same rule.

Figure 4: Distribution of Second Period Median Prices: Shocked Asset. Grouped by First and Second Halves of Sessions. Dashed line indicates the RE/PI price

Figure 5: Distribution of Second Period Average Trading Prices for Non-Shocked Asset in Periods with Inside Information: Grouped by Types of Information and by Experience. The RE prices for Positive, Negative and Independent relationship is 200, 300 and 250 respectively. The PI price is 250 in all cases.

Figure 6: Distribution of Second Period Median Trading Prices for Non-Shocked Asset in Periods with No Inside Information: Grouped by Types of Information Mirage. RE/PI price is 250 in all cases because no one has private information.

group the data by trader's experience with a specific asset relationship. We say that insider information is revealed if prices are closer (measured by MSE) to the RE predicted level than to that of PI. Figure 5 shows that prices tend to reveal the insider information after traders have some experience.

Lastly, Figure 6 illustrates situations where information mirages appear. We use a simple but rather stringent standard to define an information mirage: it occurs in a period if there are no insiders and if the median trading price is closer to the mirage level (either 200 or 300 francs) than to the RE/PI level, and the mean squared error is smaller when observed prices are compared with mirage prices than with RE/PI prices.

Overall, there are five main patterns in the price data:

1. In 19 out of 41 total periods without insiders, an information mirage occurs.
2. Information mirages that correspond to high price levels, referred to as negative mirages in figure 6, are more likely to occur than those that occur at low prices. Put differently, prices are more likely to reflect a belief that the non-shocked asset is negatively correlated with the shocked asset. This makes the non-shocked asset appear to be worth more (300 francs, instead of 200 in the case of positive correlation).
3. In most cases, insider information is revealed, especially when traders have some experience.
4. The degree of revelation of insider information depends on the relationship between the two assets. It is more likely to be revealed when the relationship is negative, followed by uncorrelated, followed in turn by positive correlation. The corresponding RE predicted prices are 300, 250, and 200 francs respectively.
5. First period prices within a round are lower than predicted by the RE and PI models.

In the next subsection, we analyze the price discovery process in detail.

3.2 The Price Discovery Process Analysis

We begin by studying the price discovery process for the even periods, the second period of each round, and then for the odd periods in the next subsection. Recall that prior to the start of any even period, all traders know which asset will be shocked.

3.3 Analysis of Price Discovery Process: Even Periods

To measure how close trading prices converge to the RE price level, we report the mean squared error (MSE)⁸ in table 3. We divide each session by halves in order to measure changes as subjects become more experienced. If the MSE values become smaller in the late periods of a session, it is an indication that a convergence process toward a benchmark price level is occurring.

We report RMSE, root mean squared error, in the second-to-last row of table 4. RMSE serves as a measures of absolute deviation of pricing error from the RE/PI level. Late-period RMSEs with respect to the RE price are much lower than early periods RMSE in most cases. For instance, when the non-shocked asset is positively correlated with the shocked asset, the error declines almost by half from 75 to 42. For negatively correlated asset and independent asset, the improvement is small.⁹

To measure convergence within a period, we also divide the transactions in each period by halves, classifying the first half of the trades as early and the second half as late. The fraction of instances in which the MSE becomes smaller for the second half of trades in a period is reported in the last row of table 4. The significance of this fraction of convergent sessions is considered by using two-tailed binomial test. Overall, the transaction data indicate both between-period and within-period convergence toward RE/PI price levels.

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⁸For the shocked assets, transactions that belong to the first and the second halves of the session are listed separately. We calculate MSE from the pooled transaction data (no smoothing between periods). The same method has been applied to the non-shocked asset, depending on its relationship with the shocked asset.

⁹One of the trials in session 6 is a outlier with MSE (=18893) 17 times larger than the rest of MSEs. Without this outlier, the improvement between early and late periods is larger (with RMSE decreasing from 56 to 33).

In order to explore whether inside information is revealed in prices, we compare the MSE for the PI prediction with that of the RE prediction for periods with insider information. Table 3 reports that in most periods with distinguishable¹⁰ insider information, the MSE of RE model is much smaller than that of PI model, especially in late periods with negative asset correlation.

Table 3: The MSE of RE Predicted Price V.S. PI Predicted Price

Session	Positive				Negative			
	Early		Late		Early		Late	
	RE	PI	RE	PI	RE	PI	RE	PI
1					(2) 532	(2) 2176	(2) 463	(2) 3622
2	(2) 1079	(2) 5835	(1) 1930	(1) 508				
3	(2) 11624	(2) 6298					(1) 1540	(1) 7834
4			(1) 1656	(1) 359	(1) 545	(1) 3327	(2) 598	(2) 3920
6	(2) 7257	(2) 5374			(2) 5887	(2) 4364	(2) 2277	(2) 2372
7	(1) 3100	(1) 8916			(1) 8046	(1) 7942	(1) 18894	(1) 9125
8	(1) 484	(1) 4593			(2) 1680	(2) 1130	(1) 652	(1) 1045

Note — Early (late) denotes periods in the first (second) half of the periods in each session. The number of periods in each cell is in the parentheses.
If MSE is smaller for RE predicted price level than for PI predicted level, then we know that trading prices are closer to full information revealing price level in these periods.

The above analyses serve as the basis for our first result.

Result 1: Market prices reveal the insider information.

3.3.1 Information Mirage

While no trader knows for sure whether the assets are correlated in the periods without insider information, there is potential for traders to mistakenly believe that the assets are correlated. Mistakenly inferring positive (negative) correlation between the two assets would drive the price of the non-shocked asset down (up) toward 200 (300) francs. Figure 6 classifies all periods with an information mirage. The criteria we use for classifying a period as containing a mirage is that (1) the median trading price is closer to the mirage price level

¹⁰Recall that it is possible that assets in our experiment are independent from each other. However, in such periods with independent assets, we cannot distinguish whether insider information is revealed or not because the theoretically predicted level with or without insiders are the same, namely 250 francs. If assets are positively/negatively correlated with each other, we can know for sure whether insider information is revealed or not. Therefore, we call it distinguishable insider information.

than the RE level, and (2) the MSE is smaller when comparing trading prices with mirage price level than with RE level.

In order to verify whether the two standards above indeed correctly classify periods based on whether or not they contain an information mirage, we estimate the parameters of King and Wadhvani [1990] model on those periods that we classify as mirage periods, and check whether the value of the parameters are in line with what their the model would predict for rounds in which there is an information mirage.

The regression specification is given in equations (1) and (2). ΔP_t^i measures the price change of an asset from period 1 to period 2 within a round. This should be a function of systematic information from both markets as well as market-specific information. Note, however, that there is a overall decrease in value for both assets because in period 2, there is only one dividend remaining to be paid, instead of two dividends remaining in period 1. Thus, we incorporate the price decrease (i.e. $P_{odd} - 250$) into v_t^i .

If the asset is the one that is shocked, there is an additional price decrease, which reduces the RE/PI price down to 125 francs, the average dividend of the shocked asset. This drop, in principle, would be interpreted as $v_t^{shocked} = -125$ francs by the uninformed traders. If, however, the traders are informed about the nature of asset correlational relationship, then the additional drop should be, instead, interpreted as $u_t^{shocked} = -125$, as the decrease affects the two assets systematically. The resulting values of the β coefficients would then be the following.

$$\begin{cases} \beta \geq +0.4 & \text{if assets are positively correlated.} \\ \beta \leq -0.4 & \text{if assets are negatively correlated.} \\ \beta = 0 & \text{if assets are independent.} \end{cases}$$

If the assets are positively (negatively) correlated, the non-shocked asset theoretical value adjusts from 250 to 200 (300) francs. Such an adjustment would be reflected as $\beta = \pm 0.4$

depending on the asset relationship, and $u_t^{shocked} = 125$ francs. An information mirage occurs if $\beta \neq 0$ even when no trader knows the nature of the correlational relationship of the assets. For periods that we have classified as mirage periods in Figure 6, we set $u_t^{shocked} = 125$ francs¹¹. For periods without an information mirage, we assume that traders infer that $u_t^{shocked} = 0$ (and thus, they believe $v_t^{shocked} = 125$). Then, we estimate the following regression specification.

$$P_{t-1}^{nonshocked} - P_t^{nonshocked} = \beta_1 * u_t^{shocked} + \beta_2 * v_t^{nonshocked} + \epsilon_t \quad (3)$$

Recall that we are interested in evaluating the effectiveness of our classification of information mirages. If a negative information mirage occurs, then the price of the non-shocked asset drops to 300 francs instead of 250 francs — a decrease 50 francs smaller in magnitude. If this is the case, then we would expect the sign of β_1 to be negative. More precisely, we expect that $\beta_1 = -0.4$ and $\beta_2 = 1$ if our mirage classification is correct¹².

The estimated $\hat{\beta}_1 = -0.44$ (p-value=0.000) confirms that the periods included in figure 6 (19 of the 41 periods with no insiders) are indeed periods in which an information mirage occurs. Moreover, the estimated value of $\hat{\beta}_2 = 1.10$, so we cannot reject the null hypothesis that $\beta_1 = -0.4$ and $\beta_2 = 1$ at conventional levels, which are the values predicted by the model of King and Wadhvani [1990]. The above is the basis for our second result.

Result 2: Information mirages are widespread, occurring in 19 of 41 possible instances.

The fact that most mirages consist of high prices that reflect the more favorable state might be due to traders' *wishful thinking*. They would rather have the non-shocked asset

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¹¹It is convenient to write $\Delta P_t^{nonshocked}$ as $P_{t-1}^{nonshocked} - P_t^{nonshocked}$ in the regression model because typically the prices become lower in the second period, and thus the difference would be positive. It follows that we should write $u_t^{shocked} = 125$ to reflect the additional drop, which is also positive.

¹²This means that the price changes from period 1 to period 2 should decrease by 250 francs on average, reflecting the overall drop in value because one dividend has been paid. Any additional change in price is a consequence of mistaken beliefs about asset correlation.

to be negatively correlated with the shocked asset. This is because the value of the non-shocked asset, and thus the average wealth of traders, would be greater if the true correlation is negative.

Table 4: Pooled Mean Square Error (MSE) from Predicted Price Level

Session	No Insider				Positive		Negative		Independent		Shocked	
	Early Periods		Late Periods		Early	Late	Early	Late	Early	Late	Early	Late
	RE/PI	Mirage	RE/PI	Mirage	RE	RE	RE	RE	RE/PI	RE/PI	RE/PI	RE/PI
1	(1) 114		(1) 1228	320			(2) 532	(2) 463	(1) 1908.4	(1) 1278.3	(4) 2339.3	(4) 98.9
2	(3) 4002		(4) 681		(2) 1079	(1) 1930					(5) 1388.4	(5) 571
3	(3) 3933	1065	(3) 6899	1336	(2) 11624			(1) 1540		(1) 3778.9	(5) 2613.9	(5) 781.2
4	(3) 1488	1085	(2) 2299	103		(1) 1656	(1) 545	(2) 598	(1) 2231.4		(5) 1183.5	(5) 127.2
5	(2) 2491	365	(4) 1359	307					(3) 1531.9	(1) 733.3	(5) 1798.5	(5) 325.3
6	(1) 415		(2) 5800	3405	(2) 7257		(2) 5887	(2) 2277		(1) 2897	(5) 5849	(5) 1182
7	(2) 6515	6383	(4) 6047	4525	(2) 4854		(1) 8046	(1) 18893	(1) 5158		(5) 2247	(5) 983
8	(2) 233		(4) 642		(1) 484		(2) 1680	(1) 652			(5) 193	(5) 41.01
Mean	(17) 2398		(24) 3043		(9) 5568	(2) 1793	(8) 3099	(8) 1109	(5) 2435	(3) 2171	(24) 2210	(24) 517
RMSE	49		55		75	42	56	55 or 33 (excl. outlier)	49	47	47	23
Fraction of periods with second-half MSE < first-half MSE	0.63	0.75	0.80**	0.82**	0.30	1.00 [†]	1.00***	0.89**	0.33 [‡]	0.50 [†]	0.77***	0.77***

Note — Early (late) denotes periods in the first (second) half of the periods in each session. The number of periods in each cell is in parentheses. A mirage price can either be 200 (mistaken inference of positive correlation) or 300 francs (mistaken inference of negative correlation). Mean refers to the weighted average MSE of all eight sessions. RMSE stands for root-mean-square error (similar to standard deviation).

* p-value<0.10.

** p-value <0.05.

*** p-value <0.01. P-value of the two-tailed binomial test for $p = 0.50$.

3.4 Analysis of Price Discovery Process: First Period of Each Round

As indicated earlier, period 1 prices are lower than the RE/PI level. In some sessions, the assets are traded at a price near 300 francs in period 1. Since some traders are willing to sell their endowed assets at a substantial discount in period 1, traders who adopt buy and hold strategy in period 1 can earn a considerable amount of money. Since traders have all experienced 11 rounds, including a practice round, they should be able to realize that in most cases, the total dividend incomes from 2 periods exceed 300 francs.

It is puzzling to see undervaluation in all first periods but not in second periods. This is partly consistent with the “swing back hypothesis” introduced by Forsythe et al. [1982]. This hypothesis, applied to our setting, is that the prices would converge to RE levels as the two-period sequence is repeated, but do so in even periods before they do so in odd periods. In our data, we do observe convergence in the even periods, but fail to see any tendency toward convergence in the odd periods with repetition.

3.4.1 Complexity aversion and low period 1 prices

A choice list task for measuring complexity aversion was administered in the last three sessions. The 34 subjects that participated in these sessions completed the task. We observe some degree of heterogeneity in complexity aversion. The switching points, after which subjects change from choosing the complex lottery to the simple one, vary between decision number 3 to 7 (see Table 1). In particular, we find that 6.25% subjects are complexity seeking, 65.62% of subjects are complexity averse, and 28.13% of subjects are complexity neutral¹³. At the individual participant level, complexity aversion correlates with trading behavior in the market.

Specifically, we find that greater complexity aversion on the part of an individual is

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¹³If the total amount of simple lottery chosen is 3, then a subject is considered as complexity seeking. If the total amount of simple lottery chosen is either 4 or 5, then she is considered as complexity neutral. If the total amount exceeds 5, she is considered as complexity aversion.

correlated with a greater quantity of asset sold by that individual in the first period of a round (Spearman $\rho = 0.4191$). Moreover, we find that greater complexity aversion on the part of a seller is also correlated with a lower average sale price for that individual (Spearman $\rho = -0.3030$). Both correlations are significant at the 5% level. There is no doubt that other factors also influence the behavior of market participants, but their attitudes toward complex lotteries seems to be a factor in the underpricing observed in odd periods, as individuals who are averse to complex distributions of payoffs sell the asset at a discount.

4 Conclusion and Discussion

Financial integration has made our world more connected than ever before, and a financial crisis can have far-reaching consequences. Economists, financial experts and journalists often blame financial contagion for widespread turmoil, blurring the distinction between the spread of a local shock justified by interdependent economic fundamentals and contagion that is not justified.

Our study focuses on one of the triggers of unjustified financial contagion, namely asymmetric information. We have studied financial contagion in a controlled experimental setting where we can carefully control information, and specify the fundamental interdependence between assets.

Our results suggest that traders may be readily led to falsely believe that there exist better informed traders who know the true relationship between assets. The consequence of false beliefs as such is that a market-specific shock can readily be transmitted to another market. Unjustified financial contagion is common in our experiment: in 19 out of 41 periods without insiders, an information mirage occurs. Indeed, mirages are much more common here than in the work of [Camerer and Weigelt, 1991], in which they were first noted.

Our experimental results have shown that *the possibility of the existence of insiders alone can trigger financial contagion*. More specifically, the impossibility for traders to exclude the

potential relevance of a shock in one market for other markets, plus the suspicion that she is not as well informed as others, appears to cause traders to become over sensitive to price fluctuations. They then attempt to extract valuable information from trades. Often the information is not there, but is erroneously thought to exist.

When insider information is actually present, it is revealed in almost all periods. In other words, asset prices reflect underlying asset correlations when such correlations are known to some traders.

In the first period of their two period life, asset prices are typically below their expected value, the price predicted by both the Rational Expectations and the Private Information models. It appears that an aversion to relatively complex lotteries plays a role, and the more complex the asset, the more underpricing that would be likely to be observed.

This complexity aversion is distinct from, though related to, ambiguity aversion. Although the probabilities of each possible outcome of a lottery may be known, if there are many possible outcomes, or the probabilities of each outcome are not round numbers, the value of the lottery may be difficult for the decision maker to compute. If the computation task is too complex, it effectively becomes a situation of ambiguity. A complexity averse individual prefers to avoid such lotteries. The assets traded in our market are complex because their payoffs may have many outcomes and part of them depend on previous outcome (a form of second-order probability). Complexity aversion appears to correlate with behavior in our markets, and may account, at least in part, for the mispricing we observe in the first period of our rounds. Even so, we cannot rule out that a third variable, such as, perhaps, cognitive ability, is related to both complexity aversion and subjects' behavior in period 1 of our rounds. Indeed, there is a correlation of $-.25$ between complexity aversion and the earnings at the individual level, though it is not significant. Exploring the correlates of complexity aversion and its relationship with market behavior is an interesting topic for future work.

Appendix: Instructions

A General Instructions

This is an experiment in the economics of market decision-making. The instructions are simple and if you follow them carefully and make good decisions, you might earn a considerable amount of money. The experiment will consist of 10 market years. In each year, there are 2 trading periods in which you will have the opportunity to buy and sell assets in a market. The currency used in the market is “*francs*” and all trading will be in terms of francs. You will be paid in Euro after the experiment by bank transfer. The exchange rate is $2200 \text{ francs} = 1$.

There are two markets in this experiment, each contains one asset. We will refer to these assets as asset A and asset B. At the beginning of each market year, you are provided with 5 units of asset A and 5 units of asset B as an initial holding. During each trading period, you may buy and sell these assets. Your inventory of asset A and B carries over from one trading period to the next, but not from one market year to the next. In other words, at the end of the second period in each year, all your asset A and asset B in your inventory will be sold to the experimenters at a price of 0. As soon as the new market year starts, you will be provided with 5 units of each asset again. Thus, your inventory of assets will be reset to 5 unit of asset A and 5 unit of asset B at the beginning of every market year.

Every unit of asset A and asset B in your inventory pays you a dividend at the end of each trading period. The dividend paid on each unit of asset A and asset B is the same for every participant. You will not know the exact value of dividend per unit of each asset until the end of each trading period. The dividend is determined by chance at the end of each period by a random number generator.

B Specific Instructions on Dividends Payment

In period 1, the computer will draw two times from a set of values to determine the dividends payment of asset A and asset B respectively for this period. These draws are made independently so that the realized dividend of asset A will not affect that of asset B. The period 1 dividend of asset A (or asset B) can be 100, 150, 350, or 400 francs, and each of the four values are equally likely. In other words, there is 25% chance that you receive one of the flowing values 100, 150, 350, or 400 francs as a dividend. The average dividend per asset (either asset A or B) is 250 francs in period 1, which is calculated by $\frac{1}{4}(100 + 150 + 350 + 400) = \frac{1}{4} * 1000 = 250$ francs.

In period 2, a shock will occur for sure on one of the assets with equal chance. This means either asset A is shocked or asset B is shocked in period 2. You will be informed about which asset is shocked at the beginning of period 2. The shocked assets will not pay the two highest dividends anymore in period 2, so that the dividend of the directly shocked asset will either be 100 or 150 francs. The average dividend per shocked asset will be reduced to 125 francs ($= \frac{1}{2}(100 + 150)$).

B.1 Asset Relationships After The Shock

After the shock, there is $\frac{1}{3}$ chance that asset A and asset B are positively related (explanation will follow), $\frac{1}{3}$ chance that they are negatively related, and another $\frac{1}{3}$ chance that they are completely not related. If they are *positively related*, then the asset that is not directly shocked will not pay the highest dividend anymore in period 2. In other words, the realized dividend value might be 100, 150, or 350 with equal chance. The average dividend in this period is 200 francs for a unit of the related asset, which is calculated by $\frac{1}{3}(100 + 150 + 350) = \frac{1}{3} * 600 = 200$ francs.

If they are *negatively related*, then the asset that is not directly shocked will not pay the lowest dividend any more, meaning that a shock to the other asset is a good news for

this asset. The dividend will be drawn from the following values $\{150, 350, 400\}$, making the average dividend per asset equals to 300 francs ($= \frac{150+350+400}{3}$).

If they are *not related*, then the asset that is not directly shocked will draw its dividend in exactly the same way as in period 1, i.e., there is an equal chance for the dividend to be one of the four values: 100, 150, 350, or 400 francs. The average dividend in this period is 250 francs for a unit of the unrelated asset. The computer will make two dividend draws regardless of whether assets are related or not. Both draws are done independently: one for the shocked asset, the other for the asset that is potentially related to the shocked asset.

For your connivence, Table 1 summarizes how the dividend of the potentially related asset is determined in period 2, as well as the average dividend per asset if the asset is related or unrelated to the shocked asset. In addition, you can look at the bottom branch labels “Not shocked” in Figure 7. Generally speaking, positively related assets are shocked in the same way as in the shocked asset, negatively related assets are shocked in the opposite way, though the related asset will be shocked (in both directions) to a lesser extent, comparing with the asset that is directly shocked.

Table 5: Dividend Structure (in francs) in Period 2

	Positively related	re- Negatively related	Unrelated
If the potentially related asset is	$\{100, 150, 350\}$	$\{150, 350, 400\}$	$\{100, 150, 350, 400\}$
Average dividend per asset if	200	300	250

B.1.1 Example

For example, suppose asset B is shocked in period 2. It means that asset B’s dividend will either be 100 or 150 francs in period 2. As we know, asset A might be related (or not) to the shocked asset, Table 1 tells you how the potentially related asset, asset A in this case, pays dividend case by case.

It says if asset A is indeed *positively* related to asset B, then asset A (the positively related asset) will not pay the highest dividend anymore. In other words, asset A's dividend might be 100, 150, or 350 francs with equal chance (see the 2nd column); if asset A is *negatively* related to the shocked asset, then column 3 is the place you want to look for, which says asset A's dividend might be one of the value {150, 350, 400}. If asset A is not related to the shocked asset B, then its dividend will still draw from the initial set of dividend values as in period 1, namely drawing from {100, 150, 350, 400}.

B.2 Dividends Account

The realized dividend in each period in all years will be paid to you in a separate account called *Dividends Account*, and it counts towards your final earnings. That is to say you cannot use your dividends earnings to purchase assets. Furthermore, the dividend draws in each period in any year are independent, meaning that the likelihood of a particular dividend in a period is not affected by the dividend in previous periods.

B.3 Clue About Relationship

Before the second period starts in any market year, a feedback screen will be shown to each of you (more details will follow) in which you can find information regarding the relation between asset A and asset B. On the screen, you will be told one of the following four messages: (i)Positive, (ii)Negative, (iii)Unrelated, or (iv)Unknown. Please be advised that what you receive on your screen could be different from what others receive on their screen. But there will be no inconsistent information in the sense that you receive “Negative”, while some other people receive “Positive” or “Unrelated”.

Please also note that what you receive in the feedback screen describes a fact in period 2 for the current market year. If you receive “Positive”, then it means that in the second period of this market year, the asset A & B will be positively related for sure. If you receive “Negative”, then it means that in the second period of this market year, the two types of

assets will be negatively related for sure. If you receive “Unrelated”, then it means that in the second period of this market year, the two types of assets will not be related for sure. An information screen with “Unknown” tells you nothing about the relationship between the assets.

Each year, there is a 50% chance that the computer will provide an informative clue (either “Positive”, “Negative” or “Unrelated”) to half of the randomly selected traders in this room. The selection is made independently in each year, so that the chance that you would be selected to know the assets’ relationship in a year is NOT affected by whether you were selected in any previous year. You will get to know whether half of the traders know the relationship or not at the end of each market year.

C Your Earnings

At the beginning of the experiment, you will be given 20,000 francs in cash account as your working capital, together with 5 units of each asset in your inventory. Your profits for the entire experiment come from two sources—from all the dividends you receive in your dividend account *and* from buying and selling assets. All money spent on purchases is subtracted from your cash account. All money received from sales is added to your cash account. Thus, you can gain or lose money on the purchase and resale of assets.

We have mentioned earlier that your inventory of assets will be reset to 5 unit of asset A and 5 unit of asset B at the beginning of every market year. A similar story holds for your cash account: at the end of every second period, you will have to repay the initial amount of cash and you will be provided with another 20,000 francs at the beginning of the new market year. Your *end of the year profits* for any year equals to the amount of francs in your cash account at the end of period 2, *plus* all dividends you earned **this** year, *minus* the repayment of 20,000 francs. Any amount exceeding 20,000 francs is yours to keep. If the profit turns out to be negative, we will set it to zero but you earn nothing for this year.

Figure 7: Dividend Structure in Period 2

C.1 Holding Periods and Earnings

Figure 7 summarizes what might happen in period 2. This piece of information would be useful to you if you were to calculate the value of the asset you hold in your inventory.

Table 6: Average Holding Value Table (in francs, per unit of asset)

current period	all as-set	shocked as-set	positively re-lated asset	negatively re-lated asset	unrelated asset
1	437.5	-	-	-	-
2	-	125	200	300	250

The Average Holding Value Table (Table 2) is created to help you make decisions. There are 6 columns in the table. First column labeled “current period” indicates the period during which the average holding value is being calculated. The second column labeled “all asset” indicates the average holding value per unit of any asset in your inventory at period 1. Any asset A or B you hold in your inventory at period 1 has an average value of 437.5 francs, which is calculated by adding up the average dividend payment in period 1 and period 2. Recall that the average dividend an asset pays to you for period 1 is 250 francs ($\frac{1}{4}(100 + 150 + 350 + 400) = \frac{1}{4} * 1000 = 250$).

As for period 2, a shock will occur to either asset A or B with $\frac{1}{2}$ chance (see Figure 7). If the asset is shocked indeed, then it will pay only 125 francs on average in period 2. If it is not shocked, then there is $\frac{1}{3}$ chance that the asset is positively related to the shocked asset, $\frac{1}{3}$ chance the asset is negatively related to the shocked asset, and another $\frac{1}{3}$ chance the asset is unrelated to the shocked asset. The average dividend, if you do the math, will be 250 if the asset is not directly shocked in period 2. Hence, any unit of asset that you hold in your inventory is expected to bring you 437.5 francs ($= \underbrace{250}_{\text{Period 1}} + \underbrace{\frac{1}{2}125 + \frac{1}{2}250}_{\text{Period 2}}$) in one market year or equivalently, two trading periods.

The third row of Table 2 tells you what amount of dividends an asset will pay *on average* in period 2 in different situations. For example, if the asset is not directly shocked but negatively related to the shocked asset, then the average holding value of the asset is 300 francs in period 2, see the second last column. Similarly, if the asset is positively related to the shocked asset, then column 4 tells you that the average holding value of the asset is 200 francs in period 2. Note that these values are just the average dividend per asset in period 2, see Figure 7.

D Trading Instruction

Figure 8 shows the trading platform, which allows you to trade assets with other traders in this room during the experiment. The heading of the screen tells you which period (out of 2 periods) and year (out of 10 years) you are in, together with the remaining time of the current trading period. Please pay extra attention to the remaining time in the upper-right corner because the trading period will be terminated immediately when the remaining time equals to 0. You are free to buy and sell asset A and asset B during the trading period, which lasts 180 seconds (3 minutes).

Below the heading section, the upper left panel shows your cash account, which is the amount of money available to you for trading or keeping. The upper right panel is the

“Control Panel”. By clicking one of the buttons in the Control Panel, you can get access to the market trading asset A or asset B as you wish. All the necessary information about the chosen asset are provided to you as soon as you click the relevant button. For example, suppose you have clicked the button asset B, the left column panel shows you how many asset B you have in your inventory (in Figure 8, you have 4 units of asset B). If you want to buy or sell a unit of asset B, you can make use of the two offers making panels with an empty field. For instance, suppose you want to sell a unit of asset B for 430 francs. This can be done by filling 430 in the field lies below the text “Make an offer to sell a share” and then click the “submit offer (to sell)” button, see the second column from the left in Figure 8. Similarly, you can fill in a desired price at which you want to buy a unit of asset B in the empty field below the text “Make an offer to buy a share” and then click “Submit offer (to buy)” button. Your buy and/ or sell offers will enter a queue under the panel “Current sell offers” or “Current buy offers” and the computer will automatically rank the offers to buy and offers to sell in the market so that it is always easy for you and other traders to find the best offers available. The best offers are always located at the bottom of the queues.

To accept an open offer to sell or buy from other traders, simply click on one of the listed prices under “Current sell offers” or “Current buy offers”, and then click the Buy or Sell button. The box labeled Transaction History lists the prices at which units have been bought or sold in this market.

As soon as the remaining time counts down to zero, the current trading period will come to an end and the feedback screen will be shown to you, see Figure 9. In the feedback screen, you will be informed about the dividends paid by each asset at the end of the trading period along with other relevant information such as the number of asset A and asset B you have in your inventory. Furthermore, the dividend account balance tells you the total amount of dividends paid by all your assets so far.

The box in the middle of Figure 9 tells you the second period’s relationship between asset A & asset B in the current market year. As we mentioned before in section B.3, it could tell

you that the assets are positively related as in Figure 9, but it might also tell you “unknown” as in Figure 10, which means you are not provided with any information about the assets’ relationship in the second period. Again, other traders may receive information regarding asset relationship different from yours.

At the end of the first period in each year, the bottom panel of Figure 9 will be displayed, which informs you exactly which asset is shocked. For instance, the bottom panel in Figure 9 says that the shocked asset is asset B. After you have reviewed all the relevant information, please click Next button, by then the next trading period shall begin.

At the end of each second period in every year, you will be informed how the assets were related, if any, as well as whether computer has distributed informative clue to the traders in this room. You will also be reminded about which asset was shocked in the second period.

You will have exactly one practicing year (consists of two periods) to help you be familiar with the trading platform. All the transactions you made in that period will not count towards your final earnings. After the practicing period, the real experiment shall begin. Should you have any questions, please do not hesitate to raise your hand, and the experimenter will come to you and help you privately. In case you do not have a question at the moment, please answer the short quiz below. Please raise your hand when you have finished all the questions and an experimenter will come to you and check your answers. Thank you for your attention!

E Small Quiz

Question 1. Is it true that each market year contains 2 trading periods and there are 10 market years altogether? T/F. (Please circle the answer for True/ False questions)

Question 2. Suppose that you are at the very end of period 2 in the third trading year, your current cash balance is 24,000 francs and your current inventory contains 6 units of asset A & 8 units of asset B. How many asset A and B will you have respectively in your

inventory at the beginning of period 1 in the next market year? ____ unit(s) of asset A and ____ unit(s) of asset B. How much francs you will be provided at the beginning of the next market year? _____ franc(s).

Question 3. There is always a shock in period 2, no matter which market year you are trading in. T / F ?

Question 4. If shock occurs to asset B, then the dividend asset B pays in this period will be drawn from:

- ☐ {100,150,350,400 }
- ☐ {100,150 }
- ☐ {350, 400}
- ☐ No dividends will be paid after the shock.

Question 5. Suppose the feedback screen at the end of period 1 tells you that asset A will be shocked. Suppose also that asset A and B are negatively related. Then asset B's dividend will be drawn from ?? in period 2.

- ☐ {100,150,350,400 }
- ☐ {100,150 }
- ☐ {100,150,350 }
- ☐ {150,350,400 }

Question 6. The question is the same as above except that asset A and asset B are not related. Then asset B's dividend will be drawn from ?? in period 2.

- ☐ {100,150,350,400 }
- ☐ {100,150 }

☐ {100,150,350 }

☐ {150,350,400 }

Question 7. Is it true that whatever the amount left in your cash account at the end of a market year will be carried over to the beginning of the next market year? T/F.

Question 8. Is it true that if a shock occurred to asset A in certain market year, it will always occur to A? T/F. If not, what is the chance that asset B is directly shocked in a particular market year? _____ %.

Question 9. Is it true that if you receive information telling you that assets are positively related with each other, then there is still chance that they are not positively related? T/F.

Question 10. Is it possible that other traders in this room receive information that is different from your information? Say, you received “unknown” while others receives “Positive”?
Yes, No.

Question 11. Is it possible that you receive an information that is inconsistent with others? Inconsistence means, e.g., you receive “positive” while others receive “negative”. Possible/Impossible.

The current period is1

Francs balance
20350

You are in market year 1 out of 10

Control Panel

Remaining Time (sec): 8

asset A

Number of asset B
in your inventory
4

Make an offer to sell a share
430

Submit offer (to sell)

Current sell offers
500
450

History of trading prices.
350

Current buy offers
270
400

Buy

Sell

Make an offer to buy a share
270

Submit offer (to buy)

Figure 8: Trading Screen (Market for Asset B is selected)

Dividend per share of Asset A

400

Dividend per share of Asset B

350

Number of Asset A in your inventory

5

Number of Asset B in your inventory

4

Total dividends of asset A paid in this period:

2000

Total dividends of asset B paid in this period:

1400

Cash Account balance

20440

Dividend Account balance

3400

Next

The 2nd period relationship between asset A & asset B in THIS market year will be

Positively related.

The shocked asset in the second period will be:

Asset B.

Figure 9: Feedback Screen WITH Relationship Clue

Dividend per share of Asset A

Dividend per share of Asset B

Number of Asset A in your inventory

Number of Asset B in your inventory

Total dividends of asset A paid in this period:

Total dividends of asset B paid in this period:

Cash Account balance

Dividend Account balance

100

400

6

6

600

2400

19120

3000

Next

The 2nd period relationship between asset A & asset B in THIS market year is Unknown.

The shocked asset in the second period will be: asset A.

Figure 10: Feedback Screen WITHOUT Relationship Clue

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