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# An Examination of Order Effects on Investors' Judg- ments in an Emerging Market: An Experimental Market Setting

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## Abstract:

This study examines the order effect of sequential presentation of different types of information (positive versus negative) on non-professional investors' decisions with respect to stock valuations in Egypt as an example of emerging stock market. It utilizes an experimental economics methodology to test how investors react to a series of positive and negative information items when such items are presented in different order. Three series of laboratory double-auction experiments were conducted, where the subjects were presented by a series of good and bad news information items. In the first (the control condition) participants were provided with a positive and a negative pieces of information in each trading period, while in the second experiment (the primacy condition) they were provided two bad news in one period and two good news in the following one. Finally in the third experiment (the recency condition), participants were provided first with the two good news followed by the two bad news. The results indicate strong evidence for primacy effect no matter the type of news provided since the news provided first in both conditions (recency and primacy) prevailed regardless of the type of the news presented (good or bad).

**Key Words:** Order Effects, recency effect, Primacy effect, Information type, experimental economics, and emerging capital markets.

## فحص لآثار الترتيب على تقييمات المستثمرين في سوق أوراق مالية ناشئ - حالة سوق تجريبي

### ملخص البحث

يهدف هذا البحث إلى دراسة أثر العرض التسلسلي لأنواع المعلومات المختلفة (الإيجابية في مقابل السلبية) على قرارات المستثمرين غير المحترفين فيما يتعلق بتقييمات الأسهم في مصر كمثال على سوق الأوراق المالية الناشئة. يستخدم هذا البحث منهجية الإقتصاد التجريبي لإختبار كيفية تفاعل المستثمرين مع سلسلة من عناصر المعلومات الإيجابية والسلبية عندما يتم عرض هذه العناصر بترتيب مختلف. تم إجراء ثلاث تجارب معملية (مزداد مزدوج)، حيث تم عرض سلسلة من عناصر المعلومات تحمل أخبار جيدة وسيئة على المشاركين. في التجربة الأولى (الحالة الرقابية) تم عرض معلومات تحمل أخبار جيدة وسيئة على المشاركين في كل فترة تداول، وفي التجربة الثانية (حالة الأولوية) تم عرض قطعتين من المعلومات تحمل أخبار سيئة في فترة واحدة وقطعتين من المعلومات تحمل أخبار جيدة في الفترة التالية على المشاركين. وأخيراً في التجربة الثالثة (حالة الحداثة) تم عرض قطعتين من المعلومات تحمل أخبار جيدة في أول فترة تداول وقطعتين من المعلومات تحمل أخبار سيئة في الفترة التالية. تشير النتائج إلى وجود دليل قوى لأثر الأولوية بغض النظر عن نوع المعلومات التي تم توفيرها نظراً لسيادة المعلومات التي تم توفيرها أولاً في الحالتين (الحداثة والأولوية) بغض النظر عن نوع المعلومات التي يتم عرضها (جيدة أو سيئة).

### الكلمات المفتاحية:

أثر الترتيب، أثر الحداثة، أثر الأولوية، نوع المعلومات، إقتصاد تجريبي، وأسواق رأس المال الناشئة.

## **Introduction:**

Prior belief revision research has shown that the order in which information is presented to nonprofessional investors plays a critical role in their judgments. In particular, the extant research has shown that individual investors are influenced by the order in which a short series of information items is presented (Tuttle, Collier, and Burton 1997) where they designed three replications of laboratory markets asking the subjects to trade the stock of two companies based on identical information in different orders. The documented evidence shows a significant recency order effect in the experimental markets. However, in a later study, Pinsker (2011) investigated the order effect of long series of good and bad news disclosures on nonprofessional investors' stock price judgment in a closed experiment. Pinsker (2011) found weak evidence of order effects (recency) in an experiment involving a stream of ten good news disclosures followed by a stream of ten bad news disclosures (or vice versa), but strong evidence of order effects (recency) in an experiment involving a stream of twenty good news disclosures followed by a stream of twenty bad news disclosures (or vice versa).

In a more recent study, Daigle, Pinsker, and Pitre (2015) investigated the impact of order effects on nonprofessional investors' belief revision when presented a long series of disclosures in an experimental market setting. Their findings indicate that initial primacy effects (i.e., more weight is placed on earlier disclosures relative to later disclosures), revert to recency effects (i.e., more weight is placed on later disclosures relative to earlier disclosures) over time.

In aggregate, prior research documents evidence of order effects (primacy versus recency) on individuals' judgements when those individuals were presented with short series or long series of disclosures, or when they are presented with the various disclosures simultaneously versus sequentially. In this study, we introduce/investigate the possibility that the order effects documented in prior research being affected by the type of information presented to the non-professional investors.

This study examines the ability of market participants in an emerging market to distinguish between good versus bad news when such information is presented to the market in different order. Three main

series of experimental markets were conducted in which participants trade shares of stock in a fictitious firm over three trading periods where relevant information about the firm is publicly announced between each of the trading periods. The order in which the information (positive versus negative) was presented in each experimental market (control condition, primacy condition, and recency condition) was manipulated to test for the effect of presenting the information in different order.

Understanding and interpreting investors' reactions to various types of information, is of primary importance to capital market researchers. The importance of such understanding increases tremendously in emerging markets, where immaturity is one of the main characteristics of the participants in such a market. According to the World Bank the term "emerging market" implies a stock market that is in transition – increasing in size, activity, or level of sophistication. Most often the term is defined by a number of parameters that attempt to assess a stock market's relative level of development and/or an economy's level of development. In general, Standard & Poor's classifies a stock market as "emerging" if it meets at least one of several general criteria: (i) it is located in a low or middle-income economy as defined by The World Bank, (ii) it does not exhibit financial depth; the ratio of the country's market capitalization to its GDP is low, (iii) there exist broad based discriminatory controls for non-domiciled investors, or (iv) it is characterized by a lack of transparency, depth, market regulation, and operational efficiency. We believe that all these criteria are apparent in the Egyptian market. That is why we implemented the experiment using a hypothetical Egyptian firm and using Egyptian non-professional investors to fairly represent an emerging market setting. The main contribution of this research paper is introducing the type of information (Good or bad) as an important factor in explaining the order effect documented in prior literature. We also believe that the analysis introduced in the paper and the results summarized, add to the prior literature that focuses on understanding the mechanics of emerging capital markets.

The results of the three experiments indicate that applying the experimental economics methodology to test the Egyptian market participants' reaction to various types of information can give very valuable

insights in studying market behaviors in emerging markets. According to the results presented in this study we can infer that in general, market participants in the Egyptian markets are able to respond correctly to publicly announced news. Such result is very significant in an emerging market like Egypt where transparency is missing. The results also indicate strong evidence for primacy effect no matter the type of news provided since the news provided first in both conditions (recency and primacy) prevailed regardless the type of the news (good or bad). Finally, we believe that the experimental economics methodology implemented in this study and the results documented would open new stream of research that can be very effective for Egyptian regulators in understand investors' behavior in such an emerging market.

The remainder of this study is organized as follows. The next section reviews related prior literature and develops the hypotheses, which will be examined in this study. The third section describes the experimental markets used to test the hypotheses and summarizes the research design and methodology. Section four summarizes the results and main findings of the experiment. Finally, in section five, we discuss some implications of the study, present some suggestions for future research, and offer our conclusions.

### **Literature Review and Hypotheses Development:**

Companies' disclosures policy tend to present investors with sequential pieces of information instead of a bundle of information that is presented simultaneously Pinsker (2007), and Pinsker (2011). A large stream of prior literature has concentrated on documenting order effects and providing theories to explain their existence. According to rational decision theory, the same sequential information should result in same decisions even if presented in different order. Extant research indicates that sequential presentation of different types of information stimulates decision bias. [Ashton and Ashton (1988), Trotman and Wright (1996), and Daigle, Pinsker, and Pitre (2015)]. The existence of such biases triggers the researchers' curiosity to understand and introduce possible reasons for such biases.

Several studies have examined the impact of order effects on investment decisions. Libby and Tan (1999) focused on the sequential

information effect of bad news. Tubbs et al (1993) tested for the presence of differential order effects in evaluation tasks with consistent and inconsistent evidence as predicted by Hogarth and Einhorn (1992) belief-adjustment model. They demonstrated that: (1) a significant recency effect existed with inconsistent evidence, (2) larger recency effects existed when the inconsistent evidence was farther apart in subjective value, (3) significant recency still existed even when the subjects were given training designed to both help them understand and assess the various pieces of evidence. Finally, they were able to demonstrate that the difference in subjective value between two pieces of evidence is the primary factor influencing the magnitude of the recency effect, regardless of whether the evidence is consistent or inconsistent.

For our current study, we refer to the original “Belief Revision Model” presented by Hogarth and Einhorn (1992) where they describe how the order of disclosures influences individuals’ judgement in their psychological framework. According to their model, the amount of belief revision that occurs depends on the weight, which the decision maker places on the specific disclosure. The weighting process is driven by the individual’s sensitivity toward the disclosure. Consequently, the higher the sensitivity, the higher the weight placed on the disclosure and thus a larger belief revision. In an emerging market where investors are expected to be more sensitive to bad news than good news, no matter the order in which they are presented, because of the lower confidence in the market performance versus more established capital markets. **Thus, we can state the two hypotheses tested in this study as follows:**

**H1:** In an emerging capital market, when a short series of consistently negative disclosures are sequentially followed by a short series of good news, as compared to simultaneously disclosed, belief revision in stock price judgments will be significantly greater in the sequential condition, indicating a primacy order effect.

**H2:** In an emerging capital market, when a short series of consistently positive disclosures are sequentially followed by a short series of bad news, as compared to simultaneously disclosed, belief revision in stock price judgments will be signif-

icantly greater in the sequential condition, indicating a recency order effect.

## **Research Design and Methodology**

To test the previous two hypotheses we conducted three series of experimental double-auction asset markets using 21 postgraduate subjects at the Arab Academy for Science and Technology (seven in each experimental market) in which participants trade shares of stock in a fictitious firm over three trading periods where relevant information about the firm is publicly announced between each trading period. The order of information (positive versus negative) was manipulated across the three experimental markets to test for order effects. In the first trading period across all three experiments, subjects were provided with a table summarizing possible liquidating dividends and the probability of each. The information presented to the participants at the beginning of the first period of trade is summarized in the appendix.

From the information presented, the subjects were able to calculate the expected value of the liquidating dividend and started trading based on this information. All bids and offers were recorded using an overhead projector in front of all six traders in each market until an equilibrium price was reached and a trade of one share of stock took place. At the conclusion of the first trading period, which ranged between five to seven minutes across the three markets to allow for at least five trades in this period, an average equilibrium price for the period was calculated.

Starting the second and the third periods, the order in which the new information was presented to the traders differed across the three markets. In the first experimental market, which we will refer to as the “control condition” two pieces of information (one good and one bad) were presented to the participants at the beginning of the second period simultaneously and then participants were asked to trade after updating their expectations based on the new information. The same thing took place at the beginning of the third trading period. Similar to the first trading period, at the conclusion of each of the second and third trading periods (each lasting five to seven minutes) an average equilibrium price for each period was calculated.

In the second experimental market, which we will refer to as the “primacy condition” the two pieces of information presented to the

participants at the beginning of the second trading period were the bad news while the two pieces of information presented at the beginning of the third trading period were both good news. This order of presenting the information to the participants was reversed for the third experimental market which we will refer to as the “recency condition” i.e., two good news in the second trading period were followed by two bad news at the beginning of the third period. At the conclusion of each trading period, an average equilibrium price is calculated for the period. At the end of the experiment, lab currency and stock shares are aggregated for each participant and then converted into Egyptian pounds for him/her to keep (thereby introducing an economic incentive for each participant to exercise effort in making the best possible trading decisions).The following table summarizes the information provided to participants at the beginning of each trading period across all three experimental markets:

**Table 1: Information provided at the beginning of each period for the three market conditions**

	<b>Beginning of round 1</b>	<b>Beginning of round 2</b>	<b>Beginning of round 3</b>
<b>Control condition</b>	Possible liquidating dividends and their probabilities	One good news and one bad news	One good news and one bad news
<b>Primacy condition</b>	Possible liquidating dividends and their probabilities	Two bad news	Two good news
<b>Recency condition</b>	Possible liquidating dividends and their probabilities	Two good news	Two bad news

### **Findings and discussion:**

Three series of experimental markets representing three market conditions (control condition, primacy condition and recency condition) were conducted using 21 Egyptian postgraduate subjects at the Arab Academy for Science and Technology (seven in each experimental market). For each experimental market, opening price at the first round was estimated as expected average of the given probabilities, i.e.,  $25*15\%+75*20\%+12*30\%+160*20\%+195*15\% = \$116$ . Three rounds were conducted and the closing price for each round was

calculated as a weighted average price of the prices traded in the round (see table 2). The statistical analysis testing the significance of the price changes across different periods across all three-market conditions are summarized in table 3.

**Table 2: Closing prices at the end of each trading period for the three market conditions:**

serial	Control Condition			Primacy Condition			Recency Condition		
	Round 1	Round 2	Round 3	Round 1	Round 2	Round 3	Round 1	Round 2	Round 3
1	120	120	124	130	120	123	119	130	130
2	120	120	124	130	120	123	119	130	130
3	120	120	124	130	120	123	119	130	130
4	120	120	125	130	120	126	119	130	130
5	122	122	124	130	120	126	119	130	125
6	122	122	124	128	116	124	119	130	125
7	122	124	124.5	128	116	124	112	135	125
8	125	124		128	119	124	112	135	125
9	125	125		128	119	124	112	135	125
10	125			128	120	127	112	135	125
11	124			130	120	127	125	136	127
12	124			130	120		125	136	127
13	124			130	120		127	136	125
14				120	121		127	136	125
15				120	121		127	138	125
16				120	121			138	125
17				120				138	
18				125				139	
19				125				139	
20				125				138	
21								138	
Avg	122.53	121.88	124.21	126.75	119.56	124.63	119.53	134.85	126.5
Rd3-Rd1			1.6758			-2.113			6.966667
% of Diff.			1.37%			-1.66%			5.82%

The closing prices summarized in table 2 show that when the participants in the primacy condition were provided two bad news at the beginning of the second period the average price went down from 126.75 to 119.56 versus the control group where the participants

were provided one good and one bad news, the price almost stayed the same (122.53 to 121.88). On the other hand, when the participants in the recency condition were provided two good news during the same trading period, the price went up from 119.53 to 134.85. This result indicates that the manipulation of good and bad news were effective and the participants were very clear on how to interpret good and bad news. The same result holds also for the third period of trade, where the price in the control condition went slightly up from 121.88 to 124.21, while in the primacy condition went up from 119.56 to 124.63 (effect of two good news), and in the recency condition the price went down from 134.85 to 126.5 (effect of two bad news). Again, this confirms the clear ability of the participants to distinguish and properly interpret good and bad news.

To test for primacy or recency effects, we compared the closing prices at the end of the third period versus the first period closing prices across all three-market conditions. By the end of the third period, all participants were provided by the same two good and two bad news. The results summarized in table 3 indicate that in the primacy condition the net decrease in price over the two periods combined is - 1.88% (down from 126.75 to 124.63) versus a net increase in price of 1.37% in the control condition over the same two periods combined. This result indicates that bad news prevailed supporting our primacy effect hypothesis when bad news are introduced first.

On the other hand, in the recency condition the net increase in price over the two periods combined was 5.82% (went up from 119.53 to 126.5) versus 1.37% in the control condition (where two pieces of information, one good and one bad, were provided at the beginning of each trading period). This result indicates that good news prevailed failing to support our recency effect hypothesis when bad news are introduced later.

Overall, the results indicate strong evidence for primacy effect no matter the type of news provided since the news provided first in both conditions (recency and primacy) prevailed regardless the type of the news (good or bad).

**Table 3:Closing prices' changes across periods for the three market conditions:**

Condi- tion		$P_2 - P_1$	$P_3 - P_1$	$P_3 - P_2$
<b>Control</b>	Change	-0.64957	1.675824	2.325397
	% of change	-0.53%	1.37%	1.91%
	Significance of change	P-value= 0.474 Insignificant at $\alpha = 5\%$ Insignificant at $\alpha = 1\%$	P-value= 0.014 Signifi- cant at $\alpha = 5\%$ Insignificant at $\alpha = 1\%$	P-value= 0.009 Signifi- cant at $\alpha = 5\%$ Signifi- cant at $\alpha = 1\%$
<b>Prima- cy</b>	Change	-7.1875	-2.11364	5.073864
	% of change	-5.67%	-1.67%	4.244%
	Significance of change	P-value= 0.000 Significant at $\alpha = 5\%$ Significant at $\alpha = 1\%$	P-value= 0.041 Significant at $\alpha = 5\%$ Insignificant at $\alpha = 1\%$	P-value= 0.000 Signifi- cant at $\alpha = 5\%$ Signifi- cant at $\alpha = 1\%$
<b>Recen- cy</b>	Change	15.32381	6.966667	-8.35714
	% of change	12.82%	5.83%	-6.197%
	Significance of change	P-value= 0.000 Significant at $\alpha = 5\%$ Significant at $\alpha = 1\%$	P-value= 0.000 Significant at $\alpha = 5\%$ Significant at $\alpha = 1\%$	P-value= 0.000 Signifi- cant at $\alpha = 5\%$ Signifi- cant at $\alpha = 1\%$

## **Conclusion:**

The study has conducted three series of experimental presenting three market conditions (control condition, primacy condition and recency condition) on Egyptian postgraduate students who have been exposed to the necessary fundamental financial information that make them able to make their calculations. By the end of the two trading periods all subjects across all three conditions have been provided by the same news (two good and two bad). The results were tested and analyzed showing that news provided first prevailed regardless it is good or bad which indicating a significant primacy order effect in the experimental markets.

Using a larger sample or more diverse population might lead to different results. However, in an emerging market environment such as Egypt especially with high instability factors economically, socially and politically rational investors might have this behavior. In upcoming research experiments using larger sample size and more diverse agents would be interesting scenario to compare with this result.

## **Appendix A**

### **(Experimental material for the control condition)**

#### **At the beginning of the first trading Period:**

**Possible liquidating dividend amounts and their associated probabilities:**

<b>Expected dividend</b>	<b>Probability</b>
\$25	15%
\$75	20%
\$120	30%
\$160	20%
\$195	15%

#### **At the beginning of the second trading period:**

The company's main supplier has unexpectedly reduced the cost of a primary component used in manufacturing one of the company's major products. A spokesman for the company stated that this news

indicates a greater likelihood of a higher liquidating dividend being realized.

Also one of the company's competitors has recently introduced a revolutionary new product which is expected to result in a loss of the company's market share. A spokesman for the company stated that this news indicates a greater likelihood of a lower liquidating dividend being realized.

**At the beginning of the third trading period:**

The company has recently been forced to recall all of its latest model products to repair a mechanical problem. A spokesman for the company stated that this news indicates a greater likelihood of a lower liquidating dividend being realized.

Also the company has recently experienced an unexpected increase in the demand for its products in its second largest market, Europe. A spokesman for the company stated that this news indicates a greater likelihood of a higher liquidating dividend being realized.

**Appendix B**

**(Experimental material for the primacy condition)**

**At the beginning of the first trading Period:**

**Possible liquidating dividend amounts and their associated probabilities:**

<b>Expected dividend</b>	<b>Probability</b>
\$25	15%
\$75	20%
\$120	30%
\$160	20%
\$195	15%

**At the beginning of the second trading period:**

The company has recently been forced to recall all of its latest model products to repair a mechanical problem. A spokesman for the company stated that this news indicates a greater likelihood of a lower liquidating dividend being realized.

Also one of the company's competitors has recently introduced a revolutionary new product which is expected to result in a loss of the company's market share. A spokesman for the company stated that this news indicates a greater likelihood of a lower liquidating dividend being realized.

**At the beginning of the third trading period:**

The company's main supplier has unexpectedly reduced the cost of a primary component used in manufacturing one of the company's major products. A spokesman for the company stated that this news indicates a greater likelihood of a higher liquidating dividend being realized.

Also the company has recently experienced an unexpected increase in the demand for its products in its second largest market, Europe. A spokesman for the company stated that this news indicates a greater likelihood of a higher liquidating dividend being realized.

**Appendix C**

**(Experimental material for the recency condition)**

**At the beginning of the first trading Period:**

**Possible liquidating dividend amounts and their associated probabilities:**

<b>Expected dividend</b>	<b>Probability</b>
\$25	15%
\$75	20%
\$120	30%
\$160	20%
\$195	15%

**At the beginning of the second trading period:**

The company's main supplier has unexpectedly reduced the cost of a primary component used in manufacturing one of the company's major products. A spokesman for the company stated that this news indicates a greater likelihood of a higher liquidating dividend being realized.

Also the company has recently experienced an unexpected increase in the demand for its products in its second largest market, Europe. A spokesman for the company stated that this news indicates a greater likelihood of a higher liquidating dividend being realized.

### **At the beginning of the third trading period**

The company has recently been forced to recall all of its latest model products to repair a mechanical problem. A spokesman for the company stated that this news indicates a greater likelihood of a lower liquidating dividend being realized.

Also one of the company's competitors has recently introduced a revolutionary new product which is expected to result in a loss of the company's market share. A spokesman for the company stated that this news indicates a greater likelihood of a lower liquidating dividend being realized.

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