

# Does the Price Influence the Assessment of Fundamental Value? Experimental Evidence

This version: January 2008

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## Abstract

Assessing the fundamental value of a firm is a difficult task. Theoretically, the market price is exogenous and should not be used in the estimation. We performed a simple experiment to pinpoint whether the price is used in fundamental value calculation. Subjects were given similar information on a firm. In the first/control situation, no price was submitted. In the second situation, the actual price was submitted to them. In the third one, a manipulated price, over valued, was given. We find that the price given, whatever it is, proves to have a clear impact on the estimations of subjects. This is consistent with anchoring-and-adjustment hypothesis on fundamental assessment and has implications on a better understanding of financial bubbles.

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**Keywords:** Fundamental Value, Price, Experiment, Anchoring.

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**JEL classification:** G12, G14

# INTRODUCTION

Fundamental value is a key concept in the theory of finance. This is the value an asset is worth according to its intrinsic characteristics: expected cash flows, risk, maturity, etc. Unlike price, that is a common knowledge caused by transactions, value has to be assessed by individuals. This fundamental value is useful for anyone who expects to buy or sell the asset. As the saying goes “Buy cheap, sell dear” is a safe way to make a profit. The mere comparison between price and his value estimation enables the investor to investigate whether the asset is cheap or dear.

On the stock market, two different approaches can be used to assess this fundamental value. The first one relies on discounting expected cash flows provided by the asset (Fisher, 1930; Williams, 1938; Gordon & Shapiro, 1956). This method is the most popular among the practitioners of finance (Viebig et al., 2008). The second approach considers the value as the actual net book value plus a goodwill that assesses intangible assets, since they are a potential of profit (Graham & Dodd, 1951; Ohlson, 1995). Thus, whatever the valuation method used, price should not be relevant in order to estimate fundamental value.

Actually, the relationship between value and price is more complicated than it is supposed to be. Grossman and Stiglitz (1980) demonstrate that it can be rational to introduce the price in the dataset insofar as it conveys information on fundamentals. The informational content provided by the price is resulting from the estimations and expectations of market operators. From this standpoint, price is a voting mechanism (Graham & Dodd, 1951). Northcraft & Neale (1987) investigate a different approach. In an experiment, they study the role of price as an anchor on value assessment. They prove that, in real estate sector, both experts and amateurs are highly influenced by the price given to them, even if it is manipulated. The authors conclude that subjects are prone to anchor to price and then adjust.

This paper investigates the influence of stock prices in assessing fundamental value of firms, through a simple experiment, that enable us to inquire the way individuals process the price in their decisions. Three behaviors can be observed: whether investors never use the price; whether they use it when they suppose it to be relevant; or they always use it, relevant or not.

In order to ensure the control and collection of data, a questionnaire was used. We provided to subjects financial and general data on an actual firm, asking them to assess its fundamental value. Three different situations enabled us to discriminate the role of price in the estimation of fundamental value. In the control situation 1, subjects did not have access to market price. The actual price was provided to subjects of situation 2. In situation 3, an “unfair”, overvalued and manipulated price was submitted. The results are consistent with the anchoring and adjustment hypothesis, since the price, actual or not, proves to have a significant influence in the assessment of fundamental value.

This paper is organized the following way. The literature about fundamental value and the hypotheses are first discussed (1). Then, we develop the methodology and discuss on the questionnaire used (2), before presenting the main results of this experiment (3).

# 1. FUNDAMENTAL VALUE AND PRICE

## 1.1 What is fundamental value?

Fundamental value is a widely used concept. However, precise definition proves to be really scarce. According to Graham and Dodd (1951), fundamental or intrinsic value could be defined as the value a stock is worth thanks to the analysis of data about its fundamentals, i.e. all information about the past, present and expected activities and assets.

“A general definition of intrinsic value would be ‘that value which is justified by the facts –e.g., assets, earnings, dividends, definite prospects.’” (Graham and Dodd, 1951, p.16)

In her review on valuation techniques, Rutterford (2004, p.134) defines “intrinsic or fair value [as] the true worth of a share, regardless of its market price.” Therefore, *fundamental/intrinsic/fair* value should theoretically not be affected by market price dynamic lead by short term speculation. If the market is not purely efficient, fundamental value can differ significantly from price. The internet stock bubble is an often cited phenomenon of mispricing, giving a striking example of a gap between fundamental value and market price (Shiller, 2000). When this gap is relatively small, the price can be considered as “fair” (Rutterford, 2004, p.134). On the other hand, when the gap is large, price is perceived as “unfair”, i.e. not right or appropriate according to fundamentals. In this situation, whether the price seems too high and the share is dear/overpriced, or the price seems too low and the share is cheap/underpriced. The detection of underpriced stocks is the corner stone of value investment style (Graham and Dodd, 1951; Buffet, 1998).

Formally, and following Grossman and Stiglitz (1980) and Lee et al. (1999), if we call  $P_i$  the price;  $V_i$  the fundamental value of firm  $i$  and  $\varepsilon_i$ , the gap between price and fundamental value:

$$\text{Ln}(P_i) = \text{Ln}(V_i) + \varepsilon_i \quad (1)$$

if  $\varepsilon_i \sim 0$ :  $P_i = P_{f,i}$ , i.e. when  $\varepsilon_i$  is small, the price is fair (henceforth  $P_{f,i}$ ).

otherwise:  $P_i = P_{u,i}$ , i.e. when  $\varepsilon_i$  is large, the price is unfair (henceforth  $P_{u,i}$ ).

## 1.2 Fundamental value estimations

In order to assess fundamental value, two main techniques are proposed. One can estimate the value of an asset whether in assessing its future income (1.2.1), or in using its patrimonial value (Graham and Dodd, 1951) (1.2.2).

### 1.2.1 The present value model

Irving Fisher wrote in 1930 a major contribution to the foundations of finance in its *Theory of Interest*. He clearly defines the way value can be calculated:

“Savings bring us to the nature of capital. Capital, in the sense of capital *value*, is simply future income discounted or, in other words, capitalized. **The value of any property, or rights to wealth, is its value as a source of income and is found by discounting that expected income.**” (Fisher, 1930, p.12-13)

According to this assumption, the value of assets is found by discounting expected incomes. Applying this to stock markets means that the value is the present value of its future dividends, and presented in Williams’ famous book (1938) through the Dividend Discounted

Model (DDM). Under the transversality hypothesis – equation (3) –, the fundamental value of firm  $i$  is the sum of discounted expected dividends:

$$V_{i,0} = \sum_{t=1}^{\infty} E [D_{i,t} | \Phi_{i,0}] (1 + r)^{-t} \quad (2)$$

$$\text{Lim}_{t \rightarrow +\infty} P_{i,t} (1 + r)^{-t} = 0 \quad (3)$$

With  $V_{i,0}$ , the value of firm  $i$  at time  $t = 0$ ;  $D_{i,t}$ , the dividend paid by the firm  $i$  at time  $t$ ;  $r$ , the discount rate and  $P_{i,t}$ , the price of stock  $i$  at time  $t$ ;  $\{\Phi_{i,0}\}$ , the information set concerning firm  $i$  at time  $t = 0$ .

Extensions of this model are widespread. Gordon and Shapiro (1956), Molodovsky (1960), Gordon (1962), Bates (1962), Holt (1962), Molodovsky, May and Chottiner (1965) or Fuller and Hsia (1984) postulate different rates and periods of dividends' growth. We do not intend to provide here a full review of these numerous models since they all rely on the same assumption – discounting expected dividends. According to Rutterford (2004) and Buckley (2003, p.636), these models are generally viewed as the “gold standard of valuation”.

### 1.2.2 Graham and Dodd's approach

In their seminal book first issued in 1937, *Security Analysis*, Graham and Dodd combine asset valuation and discounting method. This conception includes expected dividends and earnings as well as present assets. Investors collect a large set of information: balance sheets, operating income, expected cash flows, financial structure, management and strategy, firm environment that enable them to assess the firm.

Formally, the fundamental value of a firm can be viewed as the sum of its liquidation value and a “goodwill”. The liquidation value is equal to the value the assets could be sold, less the debts the firm has to reimburse. Therefore, the net worth value (also sometimes called “scrap value”) is equal to the book value of assets minus debts. Accounting value has sometimes, of course, to be reevaluated. Buildings and properties should, for instance, be sold at the market price, and could worth far more than the gross price paid years ago. Some non material assets (e.g. quality of clients, know-how, strategy...) may be assessed in the “goodwill”. Formally, it can be defined as the present value of abnormal earnings (Ohlson, 1995, Lee et al., 1999):

$$V_{i,0} = B_{i,0} + \sum_{t=1}^{\infty} E [NI_{i,t} - r_e \cdot B_{i,t-1} | \Phi_{i,0}] (1 + r_e)^{-t} \quad (4)$$

With  $V_{i,0}$ , the value of firm  $i$  at time  $t = 0$ ;  $B_{i,t}$ , the book value at time  $t$ ;  $NI_{i,t}$ , net income for period  $t$ ;  $r_e$ , the cost of equity capital and  $\{\Phi_{i,0}\}$ , the information set concerning firm  $i$  at time  $t = 0$ .

### 1.3 Hypotheses on fundamental value and price

In order to assess fundamental value, price may have (i) no impact, (ii) an influence when price is fair and (iii) an influence, whatever the price is. These hypotheses are discussed in this section.

### 1.3.1 Rational expectations

According to the main theoretical approaches in estimating the fundamental value of a stock, diverse data is processed. However, whatever the method, the price is not a reluctant data for the evaluation (Rutterford, 2004, p.134). Therefore, the price is exogenous and should not influence this assessment, i.e. operators assess the fundamental value of assets without taking the price into account. We call  $V_i$  the fundamental value and  $\{\Phi_i\}$  the information set concerning firm  $i$ . This information set does not include the price of stock  $i$ , i.e.  $P_i \notin \{\Phi_i\}$ . The price  $P_i$  can be a fair price,  $P_{f,i}$ , or an unfair price,  $P_{u,i}$ . This is our first hypothesis:

**H<sub>1</sub>:** Only fundamental data is processed in assessing fundamental value of firm  $i$ :  $V_i(\{\Phi_i\}) = V_i(\{\Phi_i, P_{f,i}\}) = V_i(\{\Phi_i, P_{u,i}\})$ .

These agents have *stricto sensu* rational expectations (Muth, 1961) and base their assessment on the real model of the economy, i.e. discounting cash flows (Fisher, 1930; Williams, 1938) and/or using other data that they consider reluctant in the assessment (Graham et Dodd, 1951).

### 1.3.2 Economically rational expectations

However, market price should give an estimation of fundamental value, since the price reflects fundamentals (Fama, 1965). Grossman and Stiglitz (1980) show that in an efficient market, it can be better for actors with economically rational expectation (Jensen, 1978) to rely on market price since they avoid processing information and transaction costs. Actually, “when there is no noise, prices convey all information, and there is no incentive to purchase information” (Grossman and Stiglitz, 1980, p.395). In this case, agents use  $\{\Phi_i\}$  and fair price  $\{P_{f,i}\}$  which is close to  $V_i$ . But after a while, the proportion of uninformed agents, ignoring fundamental information, is increasing. The price becomes unfair since it moves away from fundamental value. At this stage, the cycle is going to reverse because “if everyone is uninformed, it clearly pays some individual to become informed” (Grossman and Stiglitz, 1980, p.395). Therefore, fair price is an interesting data for operators to assess fundamental value when the gap between price and fundamental value is small. Agents do not take into account unfair prices that they consider as less credible (Northcraft and Neale, 1987).

**H<sub>2</sub>:** Fundamental data and a fair market price are used in assessing fundamental value of firm  $i$ :  $V_i(\{\Phi_i\}) = V_i(\{\Phi_i, P_{u,i}\}) \neq V_i(\{\Phi_i, P_{f,i}\})$ .

### 1.3.3 Anchoring-and-adjustment

The price, whatever it would be, proves to be considered as *anchor* for an agent in uncertainty. Tversky and Kahneman (1974) ask subjects to evaluate the number of African countries members of the UNO. Their answers were affected by a number, even if this one is presented as randomly chosen between 0 and 100. Relying on Slovic and Lichtenstein (1971), Northcraft and Neale (1987, p.85) summarize the anchoring-and-adjustment phenomenon. “The psychological literature on the ‘anchoring-and-adjustment’ heuristic suggests that (a) an arbitrarily chose reference point (anchor) will significantly influence value estimates, and (b) value estimates will be insufficiently adjusted away from the reference point toward the true value of the object of estimation”. Having to assess a property, subjects were largely influenced by the *manipulated* average price of the houses around. Similarly, an unfair price might also be used in the evaluation process since agents are not able to distinguish fair and unfair prices.

**H<sub>3</sub>:** Fundamental data and both fair and unfair prices are used in assessing fundamental value of firm  $i$ :  $V_i(\{\Phi_i\}) \neq V_i(\{\Phi_i, P_{f,i}\}) \neq V_i(\{\Phi_i, P_{u,i}\})$ .

An over-valuationed unfair price leads to higher fundamental value estimation, and an under-valuationed price leads to lower fundamental value, since agents adjust  $V_i$  to  $P_{u,i}$ :

**Corollary 1:** if  $P_{u,i} > P_{f,i}$  then:  $V_i(\{\Phi_i, P_{u,i}\}) > V_i(\{\Phi_i, P_{f,i}\})$ ,  
otherwise  $V_i(\{\Phi_i, P_{u,i}\}) < V_i(\{\Phi_i, P_{f,i}\})$

## 2. METHODOLOGY

In order to test these three hypotheses, different information sets are needed. Therefore it is not possible with market data, whereas an experimental design enable us to investigate the behaviors of individuals towards the price.

### 2.1 Experimental situation

General and financial data from a real and fair-valued French firm was submitted to subjects. They were asked to assess the fundamental value of this company. In order to pinpoint the role of price in the determination of fundamental value, subjects were divided into three groups, corresponding to three different situations:

- (S1) subjects do not have access to the stock price in their evaluation  $\{\Phi_i\}$ ;
- (S2) subjects do have access to the actual stock price in their valuation  $\{\Phi_i, P_{f,i}\}$ ;
- (S3) a manipulated, over-valuationed, stock price is submitted to them  $\{\Phi_i, P_{u,i}\}$ .

These situations allow us to discriminate between the three hypotheses. The actual stock price was used in situation two as the fair price  $P_{f,i}$ . In order to obtain an unfair price  $P_{u,i}$ , we overpriced significantly the stock. This manipulated price was given to subjects in situation three. Besides the stock price, the information set  $\{\Phi_i\}$  given to all subjects was exactly the same (see: Appendix). According to their information set, subjects had to give an estimation of fundamental value.

The firm was chosen among the firms listed in the French small capitalization market in order to avoid selecting a well known firm. To find a fair valued firm, we selected it through a screening based on Price Earning (P/E), Price to Book (P/B) and Return on Equity (RoE), relatively to its CAC Small 90 benchmark. The criterion applied was:

$$\text{Min} | P/E_i - \overline{P/E} | + | P/B_i - \overline{P/B} | + | \text{RoE}_i - \overline{\text{RoE}} | \quad (5)$$

With  $P/E_i$ ,  $P/B_i$  and  $\text{RoE}_i$ , the ratios concerning firm  $i$ ;  $\overline{P/E}$ ,  $\overline{P/B}$ ,  $\overline{\text{RoE}}$ , the mean of these ratios among the CAC Small 90 benchmark.

The firm selected was *Tonnellerie François Frères SA*<sup>1</sup>, “a France-based company that manufactures and distributes oak barrels that are used to conserve and transport [high quality

<sup>1</sup> Euronext Code: FR0000071904, Reuters Code: TEFEP.A. This company belongs to the CAC Small 90 benchmark.

wines]” (from latest annual audited report, *Reuters*). This industry is traditional, somewhere “brick and mortar”, and should be easier to evaluate than new technology firms.

The information set  $\{\Phi_i\}$  included a general presentation of the company and its products, the geographical repartition of sales, a brief SWOT analysis, an overview of economic conditions, balance sheet statements from 2003 to 2006, income statements from 2003 to 2006 as well as forecasts from 2007 to 2009, ratios (EPS, CPS and DPS) and RoE of comparable firms. The content of this company profile is largely inspired from an actual analysis provided by *Berenberg*, a German private bank.

The fair price  $P_{f,i}$  was the actual closing price of the stock of March, 3<sup>rd</sup> 2008 (EUR 36.76). The manipulated price  $P_{u,i}$  was over-valuated. The unfair price  $P_{u,i}$  was calculated as a 50 percent increase over the average price history of the firm during the preceding year. From March 5<sup>th</sup>, 2007 to March, 3<sup>rd</sup>, 2008, the average price was 40.07, and therefore  $P_{u,i}$  was set at 60.11. This is far over the historical highest price of 47.79.

## 2.2 Subjects and procedure

Subjects were chosen among students following a Master degree in finance or accounting. They all attended high level courses on firm valuation. Over 188 subjects, two questionnaires were excluded because the firm was recognized and one because of hypotheses guessing. Then, five questionnaires were set aside because the fundamental value was considered as aberrant, i.e. more than three times the interquartile range over the third and below the first quartile.

The questionnaire was submitted in March 2008. Subjects were informed that they were selected for an experiment concerning stock valuation. They were given the questionnaire, including the information set and calculators. They were not allowed to talk to each other. In order to avoid cheating, each situation was presented as independent, with different firm names<sup>2</sup> and different presentation (color and fonts) for students sitting side by side.

In order to motivate subjects in this experiment, they were told that the ten best estimations<sup>3</sup> would be rewarded by a EUR 20 buying coupon in a music and book seller. This incentive was considered as interesting and motivated them to do their best. After asking for particular questions, they were left 30 minutes to fill out the questionnaire.

## 3. RESULTS

We present the main results of the experiment that was submitted to 188 students. Among the 180 questionnaires actually exploited, 43.3% of the subjects are women. Most of the subjects are really familiar with financial markets since 15.0% of the subjects had been members of investment clubs, 61.7% already played an investment simulation game and 27.8% already bought actual stocks.

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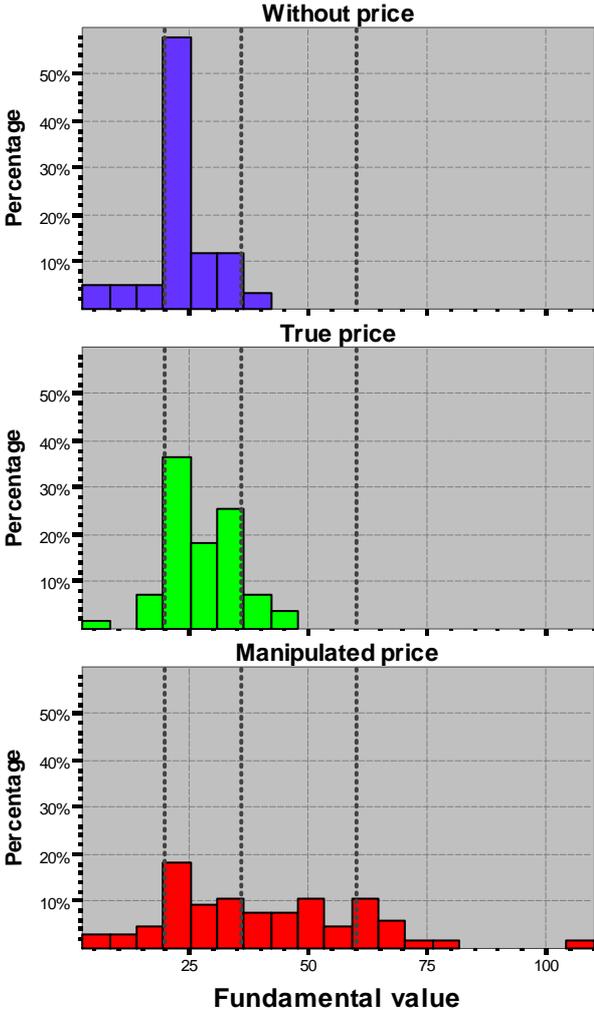
<sup>2</sup> Tonnellerie François Frères SA was called Société Martin Frères SA (without price), Tonnellerie Poillanges SA (with true price) and Compagnie du Clos de Melin SA (with manipulated price).

<sup>3</sup> Since information set was not the same between the three situations, we were not able to determinate the ten best fundamental value estimations. Indeed there was a special question about the variation of the stock price over a five year period. The ten best estimations of this variation were remunerated.

### 3.1 Fundamental value estimations

The influence of the price on the assessment process is measured through the distribution of fundamental value estimations. The diagram below represents these distributions given by the subjects in the three situations. The three vertical lines are corresponding to net asset value, actual price and manipulated price.

**Diagram 1. Distribution of fundamental value estimations**



The introduction of a price modifies the estimation given by subjects. In situation one, where no price is given, the median of the estimates is 21.5. In situation two, with the true price (36.76), the median moves to 26.0. In situation three, with the manipulated price (60.11), the median rises to 39.1. The median increase is somewhere proportional to the price increase. Indeed, the median variation (+50.4%) is close to the price manipulation (+63.5%).

The bulk of the estimations are close to net asset value (20.06). In situation one, 9 subjects on 59 considered that fundamental value equals liquidation value. If we consider estimates between<sup>4</sup> 19 and 21, the proportion is 31% for situation one, 27% and 11% for situations two

<sup>4</sup> Approximately: net asset value ± EUR 1.

and three. The table below presents descriptive statistics for fundamental value estimates. They are given for each situation and for the overall sample.

**Table 1. Descriptive statistics of fundamental value**

	Without price	True price	Manipulated price	Total
Mean	22.6	27.1	40.0	30.4
Standard deviation	7.4	7.8	20.3	15.6
First quartile	20.0	20.1	23.4	20.1
Median	21.5	26.0	39.1	26.0
Third quartile	26.4	33.0	54.0	35.8
N=	59	55	66	180

To compare the dispersions among the three situations, we compute a normalized interquartile range (IQR) defined as:  $(Q_3 - Q_1) / \text{Median}$ . This IQR-to-median ratio is respectively equal to 0.30, 0.50 and 0.78 in situations 1, 2 and 3. When true price is given to subjects, the relative dispersion is 1.67 times the one in situation 1. When manipulated price is introduced, this ratio increases to 2.63 times. The addition of prices in the data set is creating noise, especially in situation 3, when a manipulated one is given.

### 3.2 Discussion

If these distributions seem to be different at a glance, there is no proof that it is statistically robust. A Kruskal-Wallis test rejects significantly ( $p < 0.000$ ) the hypothesis of distribution homogeneity between the three situations. These results are rejecting the hypotheses  $H_1$  and  $H_2$ , since they imply the equality of at least two distributions. The Kruskal-Wallis test is consistent with the anchoring-and-adjustment hypothesis ( $H_3$ ). The three different information sets lead to three heterogeneous distributions.

**Table 2. Results of Kruskal-Wallis test**

Situation	N	Median	Ave. Rank
Without Price	59	21.5	64.1
Actual Price	55	26.0	85.7
Manipulated Price	66	39.1	118.1
Total	180	26.0	90.5

Khi-square	34.16
DF	2
Prob.	0.000

In this experiment, price proves to have an impact on fundamental value of the firm. Anchoring pinpoints an endogenous situation between price and value, and in particular a feedback effect of price on fundamental value:

$$V_i = g(P_i, \{\Phi_i\}) \quad (6)$$

The estimations given in situations 2 and 3 are influenced by the anchor, since even a manipulated, overvalued price, is integrated in the assessment process. According to corollary

1, an overvalued unfair price leads to higher median of fundamental value estimation. Therefore agents seem to adjust  $V_i$  to  $P_{u,i}$ .

More generally, if we consider function  $g$  as linear, equation (6) becomes:

$$V_i = \alpha P_i + (1 - \alpha)f(\{\Phi_i\}) \quad (7)$$

With  $0 < \alpha \leq 1$  under hypothesis  $H_3$ .

Since numerous answers given by subjects are quoting the NAV as the best estimate of fundamental value, we postulate a very simple model where the function  $f(\Phi_i)$  is reduced to the mere net asset value. Using the equation (7) and measuring  $V_i$  as the median of estimates in each situation, we find an  $\alpha$  equal to 0.36 in situation 2 and 0.48 in situation 3. Paradoxically, the manipulated price, clearly over the actual price, has an even greater influence on the assessment of fundamental value.

If subjects use the price in their estimation, they also attach less importance to other exogenous information. When subjects are given a manipulated price, they assert using less data from the balance sheet in assessing fundamental value (Mann-Whitney U-Test at a 5 percent signification). The results show that most of the subjects underweight accounting information to anchor on the unfair market price.

## CONCLUSION

Assessing the fundamental value of a firm is a difficult task. Theoretically, the market price is exogenous and should not be used in the estimation. We performed a simple experiment to pinpoint whether the price is used in fundamental value calculation. Subjects were given similar information on a firm. In the first/control situation, no price was submitted. In the second situation, the actual price was submitted to them. In the third one, a manipulated price, over valued, was given. We find that the price given, whatever it is, proves to have a clear impact on the estimations of subjects. This is consistent with anchoring-and-adjustment hypothesis on fundamental assessment.

To a certain extent, price is the mere result of a consensus. “[...] for some judgements (such as beauty or value), there may be no absolute truth” (Northcraft and Neale, 1987, p.98). Without any objective value, price is a convenient anchor that has an influence on personal beliefs. A portfolio manager interviewed illustrates this phenomenon concerning crude oil (Marsat, 2006, p.166):

“[...] Today, when we make a survey... I attended to a session in which we were asked [...] “do you believe that today there is a speculative prime [overvaluation of crude oil]?” And no one raised his hands. Whereas six month or one year ago, everyone said that there was \$5 or \$10 of speculative prime due to the geopolitical situation, hedge funds or else. Today, everyone accepts this data objectively.”

For these operators, the price that was seen as overvalued and unfair is taken for granted and fair a few months afterwards. They changed their perceptions of fundamentals rather than calling the evolution of price into question. This anchor on market price is also consistent with behaviours observed during the internet stock bubble, when operators disregarded fundamental indicators like P/E (Shiller, 2000). They preferred relying on models including *ad hoc* growth rates that indeed rationalized stock prices.

The influence of market price in the perception of fundamental value might have a stimulating explanatory power on some anomalies documented in the theory of finance. The anchor-and-adjustment hypothesis is consistent with overreaction and high volatility since a large increase (decrease) in price is viewed as a positive (negative) signal for the fundamental value. This also explains financial bubbles and their persistence. Indeed, the more the stock price is soaring the more the investors are inclined to increase their estimations of the value. On the same time, the gap between price and value is narrowing and operators are not even aware to participate to a bubble.

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## APPENDIX A

The Gordon and Shapiro model is an avatar of the general dividend discounted model assuming a unique dividend growth rate  $g$ :

$$V_{i,0} = \sum_{t=1}^{\infty} D_{i,0} [(1+g)/(1+r)]^{-t} \quad (\text{A.1})$$

The right side on the equation (A.1) converges to a finite limit if the growth rate  $g$  is less than the discounted rate  $r$ :

$$V_{i,0} \cong D_{i,1} / (r - g); \text{ with: } D_{i,1} = D_{i,0} (1 + g) \quad (\text{A.2})$$

In the long term, for a given pay-out ratio the growth rate of dividends and earnings are similar. The information set given to students allowed them to compute equation (A.2). The expected dividend per share for 2007 is EUR 0.55. The earnings' growth rate is interpolated from realized and expected EPS:  $g = 7.85\%$ . We postulate the historical mean of RoE to be a proxy for the discount rate, since marginal RoE is not a confident measurement of  $r$ . On the 2003-2006 period, the mean RoE was 9.58%.

On the basis of this information set and using the Gordon and Shapiro formula, we found that fundamental value of *Tonnellerie François Frères SA* was 31.83 in March 2008. This estimate is close to market price. Since the net asset value<sup>5</sup> is 20.06, the “financial” goodwill per share, the difference between the fundamental value and the net asset value, is equal to 11.77.

## APPENDIX B (See following pages).

This financial note relates to situation 2, with true price (EUR 36.76), where the name of *Tonnellerie François Frères SA* was turned into *Tonnellerie Poillanges SA*. Other financial notes are available on request.

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<sup>5</sup> The net asset value gives  $108\,700\,000 / 5\,420\,000 = 20.06$  per share.

## Company Profile

Tonnellerie Poillanges SA is a France-based company which manufactures and distributes oak barrels that are used to conserve and transport high quality wines. This family firm was founded in 1910. To make the barrels, the Company uses wood from forests in the French regions of Tronçais, Allier, Nevers and Vosges, as well as from Hungary. The logs are delivered to the Company's site in the village of Saint-Romain, where the logs are selected, checked, split and matured for 24 or 36 months before they are sent to twelve different production sites.

Tonnellerie Poillanges SA offers four brands of barrels: "Exclusifs", "Privilèges", "Classiques" and "Horizons". The core market is "ultra premium" quality wines. These barrels are produced in different sizes, from 225-liter barrels ("Bordeaux Transport") to 600-liter barrels ("Demi Mud"). The Company has operations worldwide: mainly in the United States, France and Oceania.

Tonnellerie Poillanges SA is quoted on the Paris Stock Exchange. On March, 3rd 2008, the cotation was EUR 36.76.

### Sales: geographical distribution

(m EUR)	2 006		2 005	
<b>France</b>	15,061	16.5%	14,661	19.0%
<b>United States</b>	35,517	39.0%	29,636	38.5%
<b>Others</b>	40,474	44.5%	32,742	42.5%
<b>TOTAL</b>	91,052	100.0%	77,039	100.0%

## Strategic Analysis

The following table summarizes opportunities and threats to Tonnellerie Poillanges SA SA.

OPPORTUNITIES	THREATS
<ul style="list-style-type: none"> <li>▪ Low debt ratio (debt to shareholders' equity &lt; 10%)</li> <li>▪ Good geographical distribution</li> <li>▪ Family firm with careful management</li> <li>▪ World leader on its market</li> <li>▪ A unique know-how</li> <li>▪ Ultra premium wines market in strong development (growth estimate: 17 % from 2004 to 2009)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Very considerable working capital</li> <li>▪ Overproduction of wine in the world</li> <li>▪ All in all, the wine market has low growth opportunities</li> <li>▪ US dollar decline</li> <li>▪ Alcohol consumption laws are more and more restrictive</li> <li>▪ Climatic risk exposition</li> </ul>

## Economic Conditions

- No large acquisition seems to be in pipeline.
- The US dollar decline stands as a risk for the Company (35% of sales are made in the US).
- The potential for additional margin improvement (EBITDA / Sales) looks limited in the forthcoming years (2007-2009).
- The Net Profit for year 2007 could suffer from persistent difficulties in Australia (Company expects another 8-10% drop in sales in this country).
- The Net Profit for year 2007 could suffer from unfavourable weather conditions in France.

## Balance Sheet Statement (m EUR)

<b>Balance Sheet-Assets</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>
Total Currents Assets	104.6	105.9	108.8	128.4
~Cash & Equivalents	11.4	9.5	10.0	16.1
~Receivables	12.5	17.8	17.6	24.0
~Inventories	76.2	78.5	81.2	88.4
Fixed Assets	14.3	15.0	16.2	26.8
<b>Total Assets</b>	<b>118.9</b>	<b>120.8</b>	<b>125.0</b>	<b>155.3</b>

<b>Balance Sheet-Liabilities</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>
Debt & provisions	44.2	37.7	31.0	45.5
~Current Liabilities (1)	43.9	33.9	28.3	34.6
~Long Term Debt	-	3.2	2.0	9.3
~Deferred Liabilities	0.2	0.3	0.4	0.6
Minority Interests	0.6	0.6	0.7	1.1
Shareholders' Equity (2)	74.2	82.5	93.2	108.7
<b>Total Liabilities</b>	<b>118.9</b>	<b>120.8</b>	<b>125.0</b>	<b>155.3</b>

(1) Current Liabilities include: Supplier Credit, Exploitation Debts and Short-Term Financial Debts.

(2) December, the 31th 2007: 5,420,000 Common Shares.

## Income Statement (m EUR)

	<b>Actual</b>				<b>Estimate</b>		
	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007 e</b>	<b>2008 e</b>	<b>2009 e</b>
Sales	70	72	77	91	96	100	103
EBITDA	19	19	21	25	27	28	29
/ Sales	27.1%	26.4%	27.3%	27.5%	28.1%	28.0%	28.2%
EBIT	17	18	19	24	25	26	27
/ Sales	24.3%	25.0%	24.7%	26.4%	26.0%	26.0%	26.2%
Net Profit	10	11	12	15	16	17	18
/ Sales	14.3%	15.3%	15.6%	16.5%	16.7%	17.0%	17.5%
Return on Equity (3)	13.5%	13.3%	12.9%	13.8%	13.4%	12.9%	12.4%

(3) The *Return On Equity* (RoE) is the Net Profit to Shareholders' Equity ratio.

## Ratios (EUR)

	<b>Actual</b>				<b>Estimate</b>		
	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007 e</b>	<b>2008 e</b>	<b>2009 e</b>
Earning Per Share (EPS)	2.11	2.19	2.36	2.80	3.00	3.18	3.32
Cash-flow Per Share (CPS)	2.15	2.54	2.54	2.99	3.36	3.58	3.76
Dividend Per Share (DPS)	0.31	0.35	0.38	0.50	0.55	0.61	0.67

## Sector Comparison

The following table presents the Return on Equity of firms close to Tonnellerie Poillanges SA. These Euroland-based firms belong to the "Food: Distillers & Brewers" Dow Jones sector. Their market capitalizations are close to Tonnellerie Poillanges SA capitalization (from half to twice time).

	<b>Actual</b>			
	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>
Return on Equity	9.5%	10.6%	6.2%	12.0%