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Raphaëlle BELLANDO
Zahra BEN BRAHAM
Sébastien GALANTI

Laboratoire d'Économie d'Orléans
Collegium DEG
Rue de Blois - BP 26739
45067 Orléans Cedex 2
Tél. : (33) (0)2 38 41 70 37
e-mail : leo@univ-orleans.fr
www.univ-orleans.fr/leo/

The performance of portfolios based on analysts' recommendations: the Tunisian case[1]

Raphaëlle Bellando
Univ. Orléans, CNRS, LEO

Zahra Ben Braham
Univ. Carthage, DEFI, CNRS, LEO

Sébastien Galanti
Univ. Orléans, CNRS, LEO

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[1] Please send comments to all authors: raphaelle.bellando@univ-orleans.fr, zahra.benbraham@gmail.com, sebastien.galanti@univ-orleans.fr.
Correspondant : Sébastien Galanti, Univ. Orléans, CNRS, LEO, UMR 7322, Faculté DEG rue de Blois BP 26739, F-45067 Orléans, France ,*Tel*: +33 2 38 41 73 62, *Fax* : +33 2 38 41 73 80
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The performance of portfolios based on analysts' recommendations: the Tunisian case

Abstract

This article aims at measuring recommendation value on the Tunisian market and uses a database of 6646 recommendations (2005-2009). We apply the methodology of calendar-time portfolio analysis. This consists in simulating a portfolio that would include stocks depending on the recommendations issued. In order to measure abnormal (or "excess") returns, the raw return of the portfolio is then compared to the evolution of the stock index and to the prediction of the Capital Asset Pricing Model. Portfolios following buy recommendations have raw monthly returns around 2% to 3%, but their excess return is not statistically different from zero. The portfolios following sell recommendations have a positive raw return but a significant negative excess return, which is explained mainly by the strong uprising trend of the Tunisian market on the sample period. Furthermore, although portfolios that follow upgraded recommendation have a positive raw return, the abnormal returns of upgrade or downgrade portfolios are not significantly different from zero. We build long-short portfolios, some of which earn a positive significant excess risk-adjusted return of 1.19% per month. Finally, the fact that "sell" signals are largely more informative than "buy" signals suggests that the market trend on a five years scale probably influences the ability of analysts to pick stocks that evolves reversely from the trend.

La performance des portefeuilles construits selon les recommandations des analystes financiers : le cas tunisien.

Résumé

Cet article cherche à mesurer la valeur des recommandations des analystes financiers de la bourse de Tunis. En utilisant une base de 6646 recommandations émises de 2005 à 2009, nous appliquons la méthodologie des portefeuilles en temps calendaire. Cela consiste à inclure dans un portefeuille les titres conditionnellement aux recommandations émises. On mesure les rendements bruts et anormaux de ces portefeuilles. Le rendement anormal est évalué, d'une part, par comparaison à l'indice de marché, et d'autre part par comparaison à la prédiction du Modèle D'Evaluation des Actifs Financiers. Les portefeuilles qui suivent les recommandations d'achat ont des rentabilités brutes de 2 à 3%, mais leur rentabilité anormale n'est pas statistiquement différente de zéro. Les portefeuilles suivant les recommandations de vente ont des rentabilités brutes positives mais des rentabilités excédentaires significativement négatives, ce que nous expliquons par une forte tendance haussière du marché sur la période. De plus, les rentabilités anormales des portefeuilles qui suivent des révisions à la hausse ou à la baisse des recommandations ne sont pas significatives. On construit des portefeuilles consistant à acheter les titres recommandés à l'achat et vendre les titres recommandés à la vente, dont certains atteignent une rentabilité anormale corrigé du risque de 1,19% par mois. Nous interprétons le fait que les signaux de vente sont bien plus importants que les signaux d'achat comme une conséquence de l'influence de la tendance boursière sur l'habilité des analystes à identifier les titres qui vont évoluer en sens inverse de la tendance.

SECTION I: INTRODUCTION

Financial analysts are an important element of financial decision-taking in the Stock Exchanges throughout the world. Most often employed by brokerage houses, they produce earnings and stock price forecasts, and also investment recommendations, all of which are signals used by stock markets participants.

In practice, recommendations are disclosed in a variety of forms, but financial medias are used to subsume them into five items: *strong buy, buy, hold, sell* or *strong sell* a given stock. Those item are usually coded on a numerical scale. In this paper, we will code *strong sell* as 1, and so on until *strong buy* as 5.

Since the 1930's, many studies aimed at measuring the value of recommendations. If one investor follows the recommendations closely, will he earn a positive return? A return that is higher than the stock market growth rate? We review here only the most salient articles[2].

The studies of Stickel (1995) and Womack (1996) analyze the impact of the recommendations on the market price. By calculating an average return for days following the recommendation, they assess the value of the information brought by the analysts. Lehavy, McNichols and Trueman (2001) complete this study by building calendar-time portfolios. Into these portfolios, they incorporatestocks according to the recommendations disclosed by the analysts through time. It allows estimating if, for an investor, the strategy consisting in following the recommendations of the analysts is profitable. Jegadeesh, Kim, Krische and Lee (2004), Green (2006) use a similar method. The main results validate the hypothesis according to which following analysts recommendation gives a return in excess of the market (or other benchmark) that is statistically significant. However, if transaction costs are taken into account, the gains are sometimes close to zero, and sometimes positive. Although the profitability of recommendations for an investor has then to be tempered, these results nevertheless underline that the information disclosed by analysts do have accuracy.

However, most of the studies cited above examine American stock markets. Do the same results apply to other markets? Does it differ according to whether they are developed markets, or emerging –and then, smaller, less liquid, and less efficient– markets?

[2] For a complete survey, see Ramnath et al. (2008)

In their paper, Jegadeesh and Kim (2006) study the returns of portfolios based on recommendations from G7 countries (1993-2002). They confirm that the distribution of *sell* and *strong sell* recommendations is smaller in the US than in other G7 countries. However, they do not conclude that US recommendations are less accurate. Indeed, portfolios based on upward revisions to "*buy*" recommendations (upgrades) or downward revision to "*sell*" recommendations (downgrades) exhibit a higher return in the US. According to the authors this demonstrates a superior ability of analysts working on US markets. They analyze the return of a portfolio consisting in purchasing the stock for which an upgrade is observed, and selling the stocks for which a downgrade is observed. Alike other studies, they compute the average monthly return in excess of the market risk-adjusted return (i.e. the average *alpha* of the Capital Asset Pricing Model –CAPM), in an equally-weighted portfolio (all stocks have equal weights). This excess return is *5.79*% in the US, *2.74*% in Japan, and lies between *1*% and *2*% in Canada, Great-Britain, France and Germany. In Italy the return is not significantly different from zero.

Lai and Teo (2008) analyze the value of recommendations on height Asian markets[3] (1994-2003). They distinguish local and foreign analysts. They show average monthly excess returns of *2,4*% to *3*% depending on the panel of analyst[4]. Interestingly, this places emerging markets in an intermediary position, between the US and the other G7 countries. Chang (2010), studying the profitability of recommendations in Taiwan (1998-2002), distinguishes local, foreign and "expatriates" (foreign analysts physically operating in the country where the stock is listed). The monthly average excess return is again between *2*% and *2.5*%, confirming the previous result[5].

These last two articles illustrate that emerging markets are often studied to compare the ability of local and foreign analysts, in order to test the "home bias".

Recently, other studies endeavored to analyze the impact of recommendations in emerging markets by themselves, no matter the origin of the analyst. The question is to know whether those markets, often perceived as complicated, less well known, and more risky, offer profitable investment opportunity as long as one follows the recommendations, or not.

[3] India, Indonesia, South Korea, Malaysia, Philippines, Singapore, Taiwan, Thailand.
[4] We compute monthly return from the daily rate in the article.
[5] We compute monthly return from the yearly rate in the article.

In a study about eleven emerging markets[6], Moshirian, Ng and Wu (2009) analyze the price impact of recommendations. They show that upgrades have more impact than in G7 countries expect the US, and less impact than in the US, c=onfirming again an intermediary position of those countries. This illustrates that the greater information asymmetries supposed to apply in emerging markets can be mitigated using recommendations. However, their study only measures price impact and do no build calendar-time portfolios, as in previous works.

Our article analyzes recommendations of financial analysts from Bourse de Tunis (Tunis Stock Exchange) and examines their value for investors. Using a database of 6646 recommendations about a maximum of 55 firms listed in Tunis between January 2005 and December 2009, we assess whether we confirm the main results of the literature concerning the excess return of portfolio based on recommendations on emerging markets.

The originality of this article lies, first, in the use of a unique dataset collected by hand from the main brokers of the Tunisian market. Second, our methodological strategy is to build calendar-time portfolios that follow recommendations –this has not been done yet, to the best of our knowledge, for an emerging country outside the Asian area. Third, our result contrast with the literature, concerning the returns of portfolio based on the *levels* of recommendations vs portfolios based on recommendation *revisions*. Finally, our conclusion put forth what we believe is a phenomenon that has not been paid sufficient scrutiny: the role of the market trend on the ability of analysts to pick over- or under-performing stocks.

We follow the methodology of calendar-time portfolios, as in Barber, Lehavy and Trueman (2001), or in Lai and Teo (2008), for example. We reconstruct portfolios that follow the recommendations. For example, a “buy” portfolio contains stock for which the analysts recommend “buy”, in a given month. We then study the return of this portfolio. It is first compared to the market return. We obtain an “abnormal” or “excess” return: if it is positive, following recommendations gives a higher return than a passive market following. Then, the return is compared to the risk-adjusted return of the CAPM. If this abnormal return is positive, the analysts are able to pick stocks which return is in excess of the reward for the assumed risk.

Our main results show that portfolios based on the level of recommendations outperform those based on the revisions of recommendations, in contrast with the previous literature about big developed markets and about the emerging Asian markets studied in Lai and Teo

[6] Argentina, Brazil, China, Chile, Hungary, India, Indonesia, Israel, South Korea, Mexico, South Africa.

(2008). On the other hand, the strategy consisting in buying a portfolio based on buy recommendation, and selling the portfolio based on sell recommendations (the "long-short" portfolio) gives an monthly return between *1.57*% (abnormal return) and *1.19*% (risk-adjusted abnormal return), which is comparable to most developed countries except the US, and slightly under the emerging Asian countries. The local analysts of the Tunisian market do add value to the investors willing to invest on this market.

We also confirm that "sell" recommendations are more profitable than "buy" recommendations. At the end of the article we provide a possible explanation by discussing the role of the market trend. We observe a strong growth of the Tunisian market in the period under study (2005-2009). To compare the asymmetry between "buy" and "sell" recommendations' profitability with the market trend is an aspect that has been under-studied. We hypothesize that analysts, in a bull market, do not clearly discriminate the stocks that will over-perform the market, and pick more easily the stocks which price will increase less. Our database does not allow us to test this point but we emphasize it as an interesting project of future research.

The remainder of this article is built as follows. The second section presents the data and the construction of portfolios. The third section describes the size, returns, and abnormal returns of the portfolios. The fourth section tests for the significance of the abnormal returns obtained, and the last section concludes.

SECTION 2:DATA AND RESEARCH METHODOLOGY

2.1 The Data

We gathered the recommendations published by the four main broker of Tunis market place. The recommendation disclosure is monthly. TunisieValeurs initiated coverage on January 2005 (hence 60 months are available), Amen Invest in 2006 (44 months), COFIB in 2008 (24 months) and Axis Capital in 2009 (12 months). This amounts to a total of 6646 recommendations, which are distributed as indicated in the following figure.

Figure 1: distribution of recommendations by broker

	Tunisie valeurs		Amen Invest		Cofib Capital		Axis Capital		Total	
Recommendationlevel	Freq.	Percent	Freq.	Percent	Freq.	Percent	Freq.	Percent	Freq.	Percent
1 (strongsell)	126	15.26	178	22.60	37	15.25	33	22.37	374	18.20
2 (sell)	311		304		132		88		835	
3 (hold)	1200	41.90	907	42.52	327	29.51	158	29.21	2592	39.00
4 (buy)	311	42.84	461	34.88	451	55.23	212	48.43	1435	42.80
5 (strongbuy)	916		283		161		50		1410	
Total	2864	100.00	2133	100.00	1108	100.00	541	100.00	6646	100.00

Note : To compute percentages, we group the « sell » and « strong sell » recommendations, and also « buy » and « strong buy » recommendations. Source: Auhors.

It is also important to analyze changes of recommendations. In the mind of the investors, a reiterated “buy” recommendation can have a different meaning than a recommendation change from “sell” to “buy”. In line with Moshirian et al. (2009) and Jegadeesh and al (2006), we define upgrade and downgrades by comparing two consecutive recommendations about the same stock from the same intermediary. When unchanged, the recommendation is a reiteration. When moving from any category 1-4 to any superior category, it is an upgrade. When moving from any category 5-2 to any inferior category, it is a downgrade.

Figure 2 : recommendationsrevision by broker

	Tunisie valeurs		Amen Invest		Cofib Capital		Axis Capital		Total	
	Freq.	Percent	Freq.	Percent	Freq.	Percent	Freq.	Percent	Freq.	Percent
Downgrade	51	1.81	110	5.29	46	4.36	4	0.81	211	3.27
Reiteration	2700	96.09	1858	89.37	972	92.13	483	98.37	6013	93.46
Upgrade	59	2.10	111	5.34	37	3.51	4	0.81	211	3.27
Total	2810	100.00	2079	100.00	1055	100.00	491	100.00	6435	100.00

Source : Authors.

We confirm, as in all the previous literature, the prevalence of reiterations. Comparing upgrades and downgrades, we remark that they split exactly even (50% - 50%). It is consistent with Moshirian and al. (2009) who find 51.7% upgrades and 48.2% downgrades, and with Jegadeesh and al. (2006) who find 46% upgrades and 54% downgrades.

2.2. Portfolios construction

We now turn to the construction of calendar-time portfolios. The stocksare integrated into the portfolios depending on the recommendation issued each month by analysts. We aim at simulating what would an investor do when taking into account all the signals sent by the four brokers of the market place. It is as if each portfolio would have four pockets, one for each broker. For the moment we consider three kinds of strategies, depending on which signal is taken into account.

Strategies based on "broad" categories: All-Buy portfolio and All-Sell portfolio

This strategy only focuses on the *level* of the recommendation and dismisses the recommendations revisions.

- *All-Buy portfolio*: each month, a stock is included in the portfolio as many times as it is recommended "strong buy" or "buy" by an intermediary.

- *All-Sell portfolio*: each month, a stock is included in the portfolio as many times as it is recommended "strong sell" or "sell" by an intermediary

Strategies based on « extreme » categories: Strong Buy portfolio and Strong Sell portfolio

We imagine an investor that would focus only on the most salient levels of recommendations.

- *Strong Buy portfolio*: each month, a stock is included in the portfolio as many times as it is recommended "strong buy" only by an intermediary.

- *Strong Sell portfolio*: each month, a stock is included in the portfolio as many times as it is recommended "strong sell" only by an intermediary

In the four previous portfolios, one stock is excluded only when there is a recommendation change. For example, if a broker changes his rating about a stock from "buy" in month *t* to "sell" in month *t+1*, then the stock would be excluded from All-Buy portfolio in *t+1* and would enter All-Sell portfolio at the same time.

Moreover, if, on the same month, two brokers recommend to “Buy” a security, and a third one recommends to “Sell” the same security, then, the security will be present two times in the All-Buy portfolio (two shares of the same firm); and one time in the All-Sell portfolio.

Strategies based on the revision of recommendations: upgrade portfolio and downgrade portfolio

In contrast with the two previous ones, this strategy simulates an investor that would react only to recommendation changes.

- *Upgrade portfolio*: each month, a stock is included in the portfolio as many times as it is upgraded by an intermediary.

- *Downgrade portfolio*: each month, a stock is included in the portfolio as many times as it is downgraded by an intermediary

The security in question is kept in the portfolio only if there is another revision in the same direction on the following month, and is excluded in the contrary.

2.3. The performance of a portfolio: abnormal returns

The returns of each of the six portfolios are computed following the duration between two consecutive recommendations, i.e. a month. Recall that a security can be integrated several times in a portfolio when several brokers disclose the same signal about it.

As usual in the field, the portfolio return, $R_{p,t}$, is defined as:

$$R_{p,t} = \sum_{i=1}^{n_{p,t-1}} x_{i,p,t-1} r_{i,t}$$

Where $r_{i,t}$is the return for stock *i* between month *t-1* and *t*,computed as$r_{i,t} = \ln(\frac{P_{i,t}}{P_{i,t-1}})$, with$P_{i,t}$the stock *i*’s price at the day of recommendation release in month *t*, and where$n_{p,t-1}$is the number of securities in month *t-1* in portfolio *p*, and finally where $x_{i,p,t-1}$is the weight of security *i* in the portfolio in month *t-1*.

The portfolio is weighted according to market capitalization[7], or « value-weighted », according to capitalization in time *t-1*, defined as$C_{i,t-1}$:

$$x_{i,p,t-1} = C_{i,t-1} / \sum_{j=1}^{n_{p,t-1}} C_{j,t-1}$$

The performance of the portfolio is measured with abnormal returns. The aim is to assess the quality of the information content of recommendations. The first way to achieve this is to compare the return with the market return. The difference is denoted as:

$$AR1_{p,t} = r_{p,t} - r_{m,t}$$

With$r_{m,t}$the return of the market index (Tunindex). It is weighted by the capitalization of stocks included in it.

The second way to measure performance is to adjust stocks return for their systematic risk, as measured by the *beta* parameter of the CAPM[8]. This measure captures the expected return conditional to the risk of the stock. Comparing it with the observed return of the recommended stock gives an idea of the ability of analyst to pick stocks with observed returns that differ from the returns predicted by the model. Indeed, this difference is measured by Jensen's *alpha*. A buy (sell) recommendation is supposed to entail a positive (negative) *alpha*: the observed return is significantly above (below) the predicted risk-adjusted return.

Using the estimated *beta*[9] for each stock, $\beta_{i,t}$, we use the standard CAPM to compute the expected return of the stock, $\tilde{r}_{i,t}$:

$$\tilde{r}_{i,t} = r_f + \beta_{i,t}(r_{m,t} - r_f)$$

Where$r_f$is the risk-free rate (see appendix A1 for its determination).We then compute the abnormal return of the stock with the alpha[10], defined as:

$$ar_{i,t} = r_{i,t} - \tilde{r}_{i,t}$$

Then the abnormal return of the whole portfolio is:

[7]We also computed equal-weights portfolios, where the weights are defined as:$x_{i,p,t-1} = 1/n_{p,t-1}$. The results obtained at the different stages of the study are very close.
[8] The data available on the Tunisian market is insufficient to use a multiple factor model, as Fama-French model.
[9]For each stock, the *beta* is estimated on a two year period and then supposed constant for the following year. Another strategy would be to res-estimate each month rolling *betas*, but this entails a high*betas* volatility, partly explained by the number of days without trade.
[10] Strictly speaking, it is the sum of the *alpha*constant and the residual.

$$AR2_{p,t} = \sum_{i=1}^{n_{p,t-1}} x_{i,p,t-1} ar_{i,t}$$

We now to the results obtained.

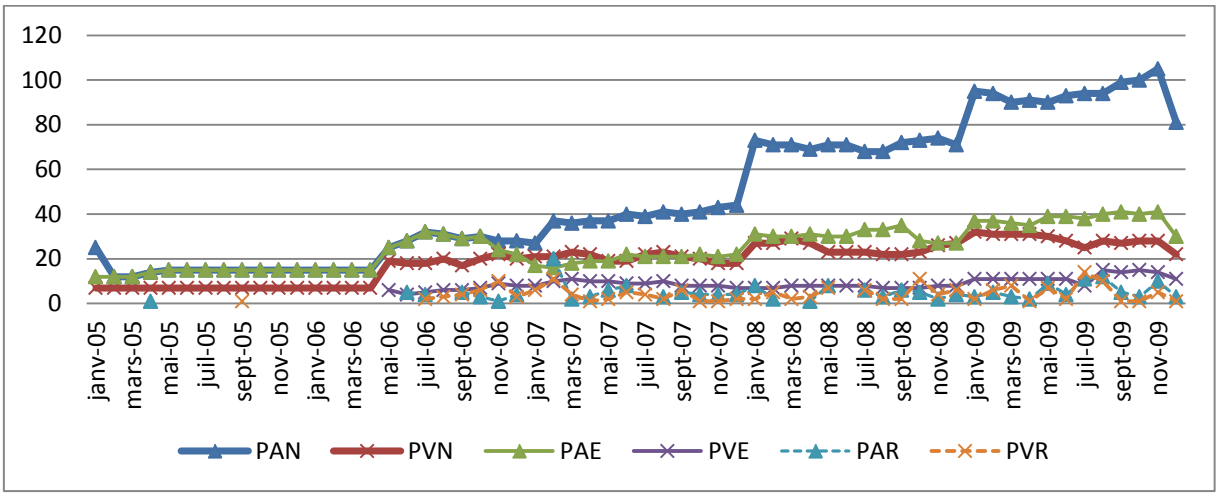
SECTION 3: SIZE, RETURNS AND PERFORMANCE OF PORTFOLIOS BASED ON ANALYSTS' RECOMMENDATIONS

Here we present information about the size of the portfolios obtained (3.1), the returns observed (3.2), and finally the cumulated abnormal returns (3.3). In this last subsection, we build "long-short portfolios", in order to fully assess the value of recommendations.

3.1 The number of stocks in each portfolio

As there are 54 firms and 4 brokers, the maximum size of a portfolio is 216 stocks for a given month, if all were recommended by all brokers with the same recommendation. The evolution of the size of portfolio is given in figure 3.

Figure3: evolution of the number of stocks in the portfolios.



PAN : All-Buy portfolio, PVN : All-Sell portfolio, PAE : Strong Buy portfolio, PVE : Strong Sell portfolio, PAR : upgrade portfolio, PVR : downgrade portfolio

This evolution is affected by the entry of new brokers: Amen Invest in may 2006, Cofib in January 2008 and Axis Capital in January 2009. After a period showing a high stability of

recommendations (almost no revisions), and by the domination of extreme recommendations (All-Buy close to Strong Buy, All-Sell close to Strong Sell), slowly the recommendations are more diverse and revisions are more frequent.

Statistics are reported in Figure 4[11]. We compare the maximum, minimum, and average number of stocks (*n)* in a given portfolio on the whole period. We also note the maximum, minimum, and average number of different stocks (*nd*) in the portfolio. We confirm the domination of buy recommendation, as All-Buy portfolio and Strong-Buy portfolio are the largest ones, and the scarcity of revisions, as the upgrade portfolio and downgrade portfolio are relatively small.

Figure 4:statistics about the number of stocks in the porfolios.

Portfolio	**All-Buy**	**All-Sell**	**StrongBuy**	**StrongSell**	**upgrade**	**downgrade**
Min *n* (= min*nd*)	12	7	12	4	1	1
Max *n*	105	32	41	15	20	14
Max *nd*	38	19	26	10	18	14
Mean*n*	48,35	19,22	25,13	8,93	5,05	4,33
Mean*nd*	26,25	13,33	18,80	6,27	4,90	4,26
Mean*n/nd*	1,90	1,52	1,42	1,48	1,03	1,02
Nb months when*n/nd*=1	0	0	2	9	33	38
Nb. Obs. T (months)	60	60	60	44	39	42

Note :*n*is the number of stocks in the portfolio, *nd* is the number of unique stocks in the portfolio.

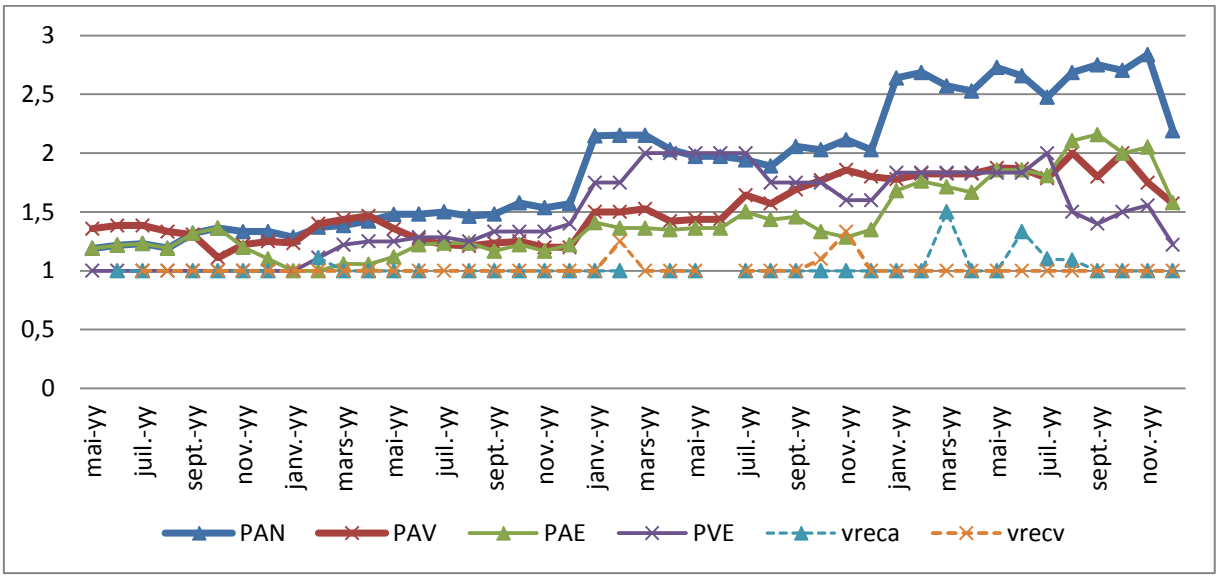
We also report *n/nd* in the table. We interpret the ratio as a rough measure of the consensus between brokers for a given month. Of course this makes sense only after May 2006, when a second broker enters the market place. When *n/nd=1*, no stock has a same recommendation made by different brokers. The disagreement is high. When *n/nd=4*, all stocks have received the same recommendation by the 4 brokers. Brokers all agree about stocks[12].

The evolution of this ratio is given in figure 5.

[11] Appendixes A2 et A3 give the monthly details.

[12]As the upper bound of *n/nd* evolves with the entry of new brokers, we verified that our results are not explained by structure effects, by calculating the gap between the ratio and its upper bound. The average values of this gap (respectively 0.92, 1.30, 1.40, 1.34, 1.93 and 1.86 for the six portfolios) confirm our comments.

Figure 5: evolution of the degree of agreement between brokers



PAN : All-Buy portfolio, PAV : All-Sell portfolio, PAE : Strong Buy portfolio, PVE : Strong Sell portfolio, vreca : upgrade portfolio, vrecv : downgrade portfolio

We note that the revisions, in addition to being scarce, are less consensual (ratio close to 1). When an upgrade occurs, it is most often made by a unique broker (34 cases on 38), and similarly for downgrades (39 cases on 41)[13]. For the other portfolios, the degree of agreement seems higher. The All-Buy portfolio ratio is often higher than 2: on average, each stock receives a "buy" or "strong buy" recommendation by at least two brokers. In the contrary, sales are only recommended by around 1.5 brokers on average. Finally, the overall rising trend of the ratio is nothing else than the consequence of the entry of new brokers.

As a whole, portfolios based on the levels are bigger, because this size is related to a relatively high degree of agreement and to the entry of new brokers; and portfolios based on revisions are smaller, probably because revisions are scarcer and less consensual.

3.2 Portfolio returns

We first examine the raw returns, and secondly the abnormal returns.

The figure 6 illustrates the following salient facts. The All-Buy and Strong Buy portfolios are more profitable and less volatile than their sale equivalent. This shows that analysts meet the minimal quality of information that an investor is entitled to expect. The All-Buy and All-

[13] The difference with the total in figure 4 stems from the fact that here we consider only the period with several brokers, i.e., after May 2006.

Sell portfolio are finally quite close to the extreme portfolios. All four portfolio based on recommendation levels are less profitable than the market index. The most profitable strategy is the one based on revisions: particularly, the upgrade portfolio is the only one to reach a raw return that is higher than the market. However, we must mitigate this aspect because of the high volatility of returns of this portfolio –probably due to an insufficient diversification.

Figure 6 : rawreturns

Market& Portfolios	Tunindex	All-Buy	All-Sell	StrongBuy	StrongSell	upgrade	downgrade
Average	1,97%	1,92%	0,34%	1,74%	0,15%	2,83%	1,83%
Standard deviation	3,13%	3,46%	4,22%	3,54%	5,35%	7,03%	8,87%
Correlation w/ market index		91,23%	65,59%	89,60%	16,72%	57,92%	46,14%

Note : Monthlyreturns.

We note that the first three portfolios are quite well correlated with the index. The most deceitful is the downgrade portfolio: its return almost equals the market return. Whereas upgrades seem justified, downgraded stocks do not experience a price decrease, not even a weak increase, but seem to increase relatively sharply. Furthermore this portfolio is the most volatile.

Turning to abnormal returns (figure 7), we note that buy portfolios are performing poorly. In the contrary, the upgrade portfolio has a positive abnormal return: it outperforms the market index (+1.13%), even when adjusting for the risk of stocks (+0.88%). Again, this must be mitigated by the high volatility observed.

Figure 7 : Abnormalreturns

	All-Buy	All-Sell	StrongBuy	StrongSell	upgrade	downgrade
AR1 : Relative to Tunindex						
Mean	-0,03%	-1,61%	-0,21%	-1,67%	1,13%	-0,09%
Standard dev.	1,44%	3,19%	1,59%	5,81%	5,67%	7,69%
Correlation w/ Tunindex	1,40%	-11,58%	1,21%	-41,23%	19,29%	14,70%
AR2 : Relative toCAPM						
Mean	-0,05%	-1,24%	-0,27%	-0,63%	0.88%	0,23%
Standard dev.	1,43%	3,26%	1,58%	5,20%	6,85%	7,87%
Correlation w/Tunindex	1,07%	9,13%	-5,53%	-2,31%	12,87%	25,57%

Note: Monthlyreturns.

The All-Sell and Strong Sell portfolios show a negative abnormal return, which is a good news since it means that the sale signals do provide a valuable information. The downgrade portfolio shows inconclusive results, as the abnormal returns are weak and very variable.

Taken as a whole, All-Buy and Strong Buy portfolios exhibit a poor performance whereas the All-Sell and Sell portfolios seem to provide valuable information. Concerning the revisions, the large difference between upgrades and downgrades may come from the initial level of the revised recommendation. Figure A4 in the appendix shows that, unsurprisingly, downgrades concern stocks that were initially recommended to "strong buy" or "buy". And precisely, these levels are the ones for which the quality of information is weak. In the contrary, upgrades concern stock initially recommended at "hold" or "sell" levels.

3.3 Portfolios performance in terms of cumulated abnormal returns

To complete the description of abnormal returns, figure 8 provides the cumulated abnormal returns over the sample period, for every portfolio. To ease comparison, we suppose that portfolios based on sale recommendation are sold in order to obtain a positive sign of the return.

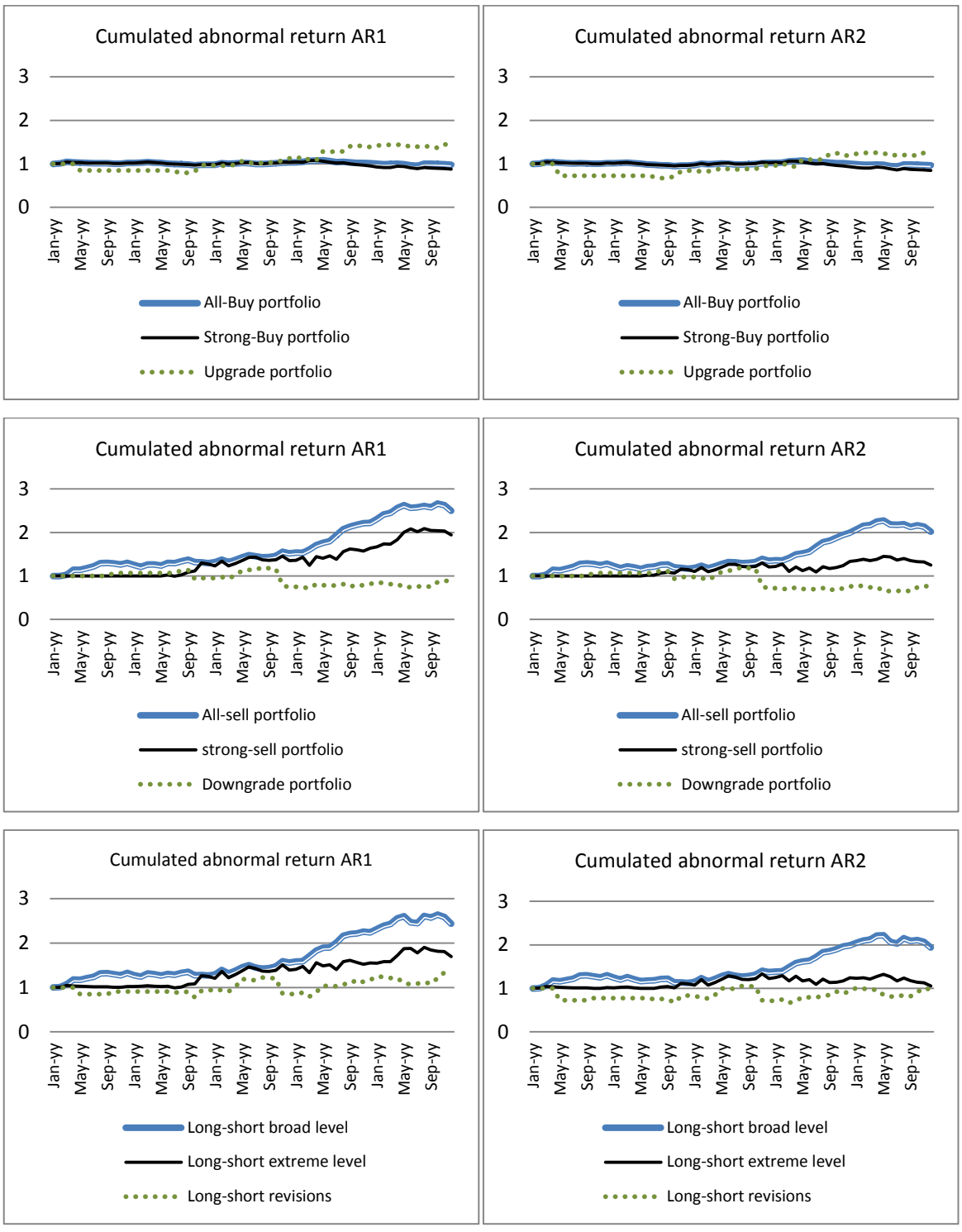
We also build "long-short portfolios". We suppose that an investor invests one unit in a buy portfolio and sells one unit of the corresponding sell portfolio in every point of time[14]. Although the Bourse de Tunis does not allow for short sales, this strategy represents the full value that can possibly be extracted from analysts' information. We then construct the three following long-short portfolios:

- *Long-short broad level* portfolio. Each month, one unit of the*All-Buy* portfolio is purchased and one unit of the *All-Sell* portfolio is sold.
- *Long-short extreme level* portfolio. Each month, one unit of the *Strong Buy* portfolio is purchased and one unit of the *Strong Sell* portfolio is sold.
- *Long-short revision* portfolio. Each month, one unit of the *upgrade* portfolio is purchased and one unit of the *downgrade* portfolio is sold.

[14]There are month in which a given recommendation is not disclosed (e.g. "Strong Sell"…). Recall that in this case, no portfolio is built for that month. The return of the long-short portfolio being the difference of two portfolios' return, it is computed if, for a given month, at least one of the two portfolios exists. In the case when one of the two portfolios is empty, its return is considered as zero. It follows that the average return of the long-short portfolio does not necessarily correspond to the simple difference of its two components' average return.

The observation of graphs in figure 8 confirms the previous comments. Analysts do add value to portfolios when they issue “sell” or “strong sell” recommendations. It seems clear that the source of the long-short portfolios returns stems from stocks recommended for sale. In the contrary, the revisions do not look like having a great impact.

Figure 8 : cumulated abnormal returns



Note. The graphs report the abnormal returns of the different portfolios (as measured by: AR1, the excess return compared to market index return, and AR2, the excess return compared to the CAPM prediction), cumulated over the sample period (January 2005-December 2009). We consider that *All-Sell*, *Strong-Sell*, and *downgrade* portfolios are sold. The long-short portfolios' abnormal returns consist in the difference between the abnormal returns of its two components (if at least one of the two is non-empty on a given month).

This result differs from the literature according to two aspects. The first difference is that we do not find that revisions entice the most important returns, as it is usually found in studies on international markets (Barber et al. 2001, Jegadeesh et al. 2006 Lai et al. 2008). Revisions are seen as more informative than the levels of recommendations; whereas our data suggests the contrary. Nevertheless, a common point with the previously cited articles is that we find that *long-short* portfolios generate positive excess returns, and that *sell* or *downgrade* portfolios are more important than *buy* or *upgrade* portfolios in driving this result.

SECTION 4: TESTS ON AVERAGE AND MEDIAN RETURNS AND INTERPRETATIONS

We now examine the performance of the strategies consisting in following analysts' recommendation in the Tunis stock exchange during the 2005-2009 period. We test for the statistical significance of the portfolios returns described in the previous section.

As usual in this literature, we use Student *t* tests. However, some preliminary tests showed that the distribution of returns do not follow a Gaussian distribution, in particular, they are not symmetrically distributed around the mean. This may disrupt Student t-test, as those suppose the Gaussian distribution.

This is why we add two classical non-parametric tests that have not been used in the articles cited above. First, we use the signed ranks Wilcoxon *W* test, which tests for median or mean abnormal return being equal to zero under the hypothesis of a symmetric distribution.Second, we use the sign *S* test, which tests for the median abnormal return being equal to zero.

For brevity, we name « buy portfolios » the *All-Buy*, *Strong Buy*, and *upgrade* portfolios and «sale portfolios» the *All-Sell*, *Strong Sell* and *downgrade* portfolios. We define the following null (H_0) and alternative (H_1) hypothesis.

For the buy portfolios and long-short portfolios:

H_0: $m = 0$ vs H_1: $m > 0$,

with *m* the median or the mean of the returns.

For the sale portfolios, we test:

$H_0 : m = 0$ vs $H_1 : m < 0$.

Figure 9 gives the tests results[15].

Figure 9. Tests for the nullity of portfolio returns

	T obs	Raw return	*T*	*W*	*S*	AR1	*T*	*W*	*S*	AR2	*T*	*W*	*S*
All-Buy	60	**1,92%**	*0.000*	*0.000*	*0.000*	-0,03%	*0.570*	*0.847*	*0.849*	-0,05%	*0.611*	*0.872*	*0.849*
All-Sell	60	0,34%	*0.781*	*0.693*	*0.500*	**-1,61%**	*0.000*	*0.000*	*0.010*	**-1,23%**	*0.002*	*0.000*	*0.010*
Long-short broad level	60	**1,58%**	*0.001*	*0.001*	*0.002*	**1,57%**	*0.001*	*0.002*	*0.005*	**1,19%**	*0.010*	*0.010*	*0.001*
Strong Buy	60	**1,74%**	*0.000*	*0.000*	*0.000*	-0,21%	*0.843*	*0.937*	*0.965*	-0,27%	*0.905*	*0.958*	*0.939*
Strong Sell	44	0,15%	*0.574*	*0.526*	*0.500*	-1,67%	*0.033*	*0.036*	*0.183*	-0,63%	*0.216*	*0.181*	*0.183*
Long-short extreme levels	60	**1,62%**	*0.015*	*0.015*	*0.010*	1,01%	*0.082*	*0.200*	*0.398*	0,19%	*0.387*	*0.484*	*0.302*
upgrade	39	**2,83%**	*0.008*	*0.011*	*0.002*	1,13%	*0.113*	*0.100*	*0.100*	0,88%	*0.216*	*0.115*	*0.055*
downgade	42	1,83%	*0.096*	*0.175*	*0.268*	-0,09%	*0.470*	*0.174*	*0.108*	0,23%	*0.573*	*0.696*	*0.500*
long-short revisions	44	0,76%	*0.285*	*0.287*	*0.382*	1,09%	*0.207*	*0.155*	*0.382*	0,57%	*0.347*	*0.229*	*0.382*

The table reports the returns and p-values of the tests T (Student) W (Wilcoxon signed-rank) and S (Sign test). P-values are given for a positive median alternative hypothesis (for buy and long-short portfolios) and for a negative median alternative hypothesis (for sale portfolios). The returns in bold indicate returns that are statistically significant at the 5% level all three statistics.

The results are interesting in two aspects: the asymmetry between buy and sale recommendations, and between the levels and revision of recommendations.

The profitability of buy vs sale portfolios.

Since Womack (1996), the literature posits that buy recommendations are far more numerous than sell recommendations. This constitutes a positive bias. As investors learn this bias over time, they tend to discount buy recommendations and pay more attention to sell recommendation. When transposed to the framework of calendar-time strategies, this imply that portfolios based on buy recommendation should under-perform those based on sale recommendation. The evidence for this fact is given in the articles of Barber and al. (2001), Jegadeesh and al (2004, 2006), Green (2006), Lai and Tao (2008), Chang (2010). We confirm this result in our study.

Nevertheless, as most of those results more significance for long-short portfolios and for sale portfolios, they also document significance for buy portfolios. For example in Green

[15]As these are unilateral tests, we checked that p-values given by RATS and STATA softwares do correspond.

(2006 Table 6, panel C), upgrade portfolio are as significant as downgrade portfolio, whereas the size of the excess (abnormal) return is smaller for the upgrade portfolio. In Lai and Tao (2008), the raw return of buy portfolio is significant (whereas it is not the case when risk-adjusted by the CAPM), and in most variants upgrade portfolios have significant returns. In Chang (2010), the long (buy) portfolio is even more significant than the short (sell) portfolio.

It is not the case in our study. Whereas the raw return of the *All-Buy* portfolio and the *upgrade* portfolio are quite different from zero (resp. *1,92*% and *2.83*%), it is no longer significant when computing excess return, compared to market index (reps.*-0.03*% and *1,13*%)) or risk-adjusted *(-0.05*% and *0.88*%).

Our explanation for it concerns the ability of analyst to order the stocks that are expected to perform, during a bear period. It is the case in our sample (see appendix A3), as the trend is steadily upward from 2005 to 2009. In that framework, it is possible that analyst fail to identify stocks that will perform better than the trend (the raw returns of buy portfolios are positive, but not the abnormal returns). In the contrary, they succeed in identifying stocks that evolves reversely from the trend, i.e. in our case, abnormal return of *All-Sell* portfolio is highly significant: *-1.61*% when compared to market index and *-1.23*% when risk-adjusted. This drives most of the return of the portfolio that purchases the *All-Buy* and short-sells the *All-Sell*. However, as there is no bear period in our sample, we are not able to test this explanation.

The profitability of recommendation levels vs revisions.

Since the article of Jegadeesh and al. (2004), the revisions of recommendations are considered as more susceptible to entail positive abnormal returns than the levels of recommendations do. For this reason Jegadeesh and al (2006) do not event mention portfolios based on the level of recommendation, but only on upgrades or downgrades. In Lai andTao (2008), the upgrade portfolios bring a higher return than buy portfolios, and downgrade portfolios bring a more negative return than sell portfolios.

In our study in the contrary, level-based portfolios outperform revision-based portfolios. Considering excess return, upgrade, downgrade, or purchasing upgrade and short-selling downgrade portfolios are never significant. Still, the long-short portfolio gives an abnormal return between 1.09% compared to the stock index (i.e. around 13.9% annualized), and 0.57% when risk-adjusted. Whereas “extreme” levels do not entail real profitability, the portfolio that

short-sell "All-Sell" obtains a significant abnormal return of 1.61% (21.1% annualized) and of 1.23% (15.8% annualized) when risk-adjusted.

We explain this result as follows. The specificity of the Tunisian market, unlike developed and Asian markets; is that investors seem to wait for a confirmation when a revision occurs[16]. Instead of reacting quickly, investors postpone their trading decision. It is possible that investors on the Tunisian market are more risk-adverse than on other places; but a more plausible explanation is that they simply follow a different institution which is to wait for a confirmation of the revision. Suppose, for example that an upgrade to "Buy" occurs. Then, investors wait for the next recommendation on this firm. If the "Buy" is reiterated, only then the stock is purchased.

Although this explanation is consistent with our results, we should condition revisions on the current level of the recommendations[17]. For example, the impact of an upgrade depends on whether it is an upgrade to "Strong Buy" or to "Hold". However, the small size of our sample does not allow us to treat this aspect.

SECTION 5: CONCLUSION

Our study undoubtedly has limits and calls for future research. For example, as many results of the literature[18], we do not account for transaction costs. Indeed, brokerage commissions would surely reduce the returns mentioned in the paper.

However, our results bring evidence of the value of analysts' recommendation on the Tunisian market. Buy recommendations entail returns that are clearly above sale recommendations.

The strategy consisting in buying the upgrade portfolio and selling the downgrade portfolio brings a risk-adjusted return, computing the CAPM alpha, of *0.57*% per month, using a value-weighted portfolio. Although not statistically different from zero, it is positive, which indicates that analysts are able to differentiate stocks depending on whether their price is going to rise or fall. This return can be compared to those computed the same way in Jegadeesh and al. (2006). They are *2.07*% in the US, *0.95*% in Canada and *0.67*% in Britain. All three are significant. It is *1.10*% in Japan, *0.51*% in Germany, *0.37*% in Italy, and *0.25*%

[16] We obtain a similar conclusion in a previous study on the Tunisian market about the price impact of recommendation; see Ben Braham and Galanti (2013).
[17] As it is done in Barber and al. (2010).
[18] With the exceptions of Barber and al. (2001) and Green (2006)

in France, and those four are not statistically different from zero. In Lai and Tao (2008), the average of height emerging Asian countries for the same strategy gives *2.42*% and *3.05*%[19]. Our results hence place the Tunisian market closer to European developed country than to Asian emerging markets.

We also show that returns of portfolio for "broad" levels (All Buy and All-Sell) outperform those based on "extreme" levels (Strong Buy and Strong Sell). Furthermore, the poor performance of buy portfolios is probably due to the bullish orientation of the market during our sample period. The analysts are able to pick stocks that are going to deeply under-perform the market. But they are much less able to pick stocks that will do better than the market.

Although the relation between the market trend and the performance of recommendation levels is sometimes evoked in the literature, it has not, as far as we are aware of, been paid enough attention, and this constitutes an interesting perspective for future research.

[19] We translate into monthly basis the daily percentage of their article, supposing 22 trading days. 2.42% is for foreign analysts and 3.05% for local analysts.

APPENDIXES

A1: Definition of the risk-free rate (Rf)

lesSICAVs monétaires sont inexistantes sur le marché tunisien et que les produits monétaires existants sont plutôt les billets de trésorerie, les certificats de dépôt, ou encore les comptes de dépôt à terme. Mais ces produits présentent de nombreuses restrictions (un remboursement à échéance, un montant minimal de placement, un blocage obligatoire) et une liquidité réduite. Ils ne sont, donc, pas adaptés à la gestion de portefeuilles boursiers d'où la gestion actuelle de la liquidité disponible en portefeuille.

Les taux afférents à ces produits sont de toute façon inexploitables étant donné l'absence de statistiques officielles : ce sont souvent des négociations de gré à gré qui se font au cas par caset pour lesquelles aucun historique de données n'est disponible.

Nous avons donc choisi pour le calcul du taux sans risque les SICAVs à cent pour cent obligataires les moins risquées du marché durant la période 2005-2009 selon avec les gestionnaires d'organisme de placement collectif en valeurs mobilières (OPCVM) de la place.

Les rendements des SICAVs étant publiés annuellement, on a reporté ci-dessous les deux séries ainsi que leur moyenne utilisée pour le taux sans risque.

Année	**SICAV Rendement**	**Tunisie SICAV**	**Moyenne**
2005	3.7	4	3.85
2006	3.4	4.1	3.75
2007	3.7	3.7	3.7
2008	3.7	3.7	3.7
2009	3.3	4	3.65
Moyenne	3.6	3.9	**3.7**
Ecart-type			**0.0758**
Variance			**0.0058**

A2 : Statistique sur les portefeuilles

Tableau A1. Evolution du nombre de titres total dans les portefeuilles

	PAN	PVN	PAE	PVE	PAR	PVR		PAN	PVN	PAE	PVE	PAR	PVR
janv-05	12	7	12				juil-07	39	22	21	9		4
févr-05	12	7	12				août-07	41	23	21	10	3	2
mars-05	12	7	12				sept-07	40	21	21	8	5	6
avr-05	14	7	14		1		oct-07	41	20	22	8	4	1
mai-05	15	7	15				nov-07	43	18	21	8	4	1
juin-05	15	7	15				déc-07	44	18	22	7	4	2
juil-05	15	7	15				janv-08	73	27	31	7	8	2
août-05	15	7	15				févr-08	71	27	30	7	2	5
sept-05	15	7	15			1	mars-08	71	29	30	8		2
oct-05	15	7	15				avr-08	69	27	31	8	1	3
nov-05	15	7	15				mai-08	71	23	30	8	8	7
déc-05	15	7	15				juin-08	71	23	30	8		
janv-06	15	7	15				juil-08	68	23	33	8	6	6
févr-06	15	7	15				août-08	68	22	33	7	3	2
mars-06	15	7	15				sept-08	72	22	35	7	6	2
avr-06	15	7	15				oct-08	73	23	28	7	5	11
mai-06	25	19	25	6			nov-08	74	26	27	8	2	4
juin-06	28	18	28	4	5		déc-08	71	27	27	8	4	6
juil-06	32	18	32	5	4	2	janv-09	95	32	37	11	3	2
août-06	31	20	31	6		3	févr-09	94	31	37	11	5	6
sept-06	29	17	29	6	5	4	mars-09	90	31	36	11	3	8
oct-06	30	20	30	7	3	6	avr-09	91	31	35	11	2	1
nov-06	28	22	24	9	1	10	mai-09	90	30	39	11	9	7
déc-06	28	20	22	8	4	3	juin-09	93	28	39	11	4	2
janv-07	27	21	17	8		6	juil-09	94	25	38	8	11	14
févr-07	37	21	16	10	20	11	août-09	94	28	40	15	12	10
mars-07	36	23	18	11	2	4	sept-09	99	27	41	14	5	1
avr-07	37	22	19	10	3	1	oct-09	100	28	40	15	3	1
mai-07	37	19	19	10	6	2	nov-09	105	28	41	14	10	5
juin-07	40	19	22	9	8	5	déc-09	81	22	30	11	3	1

PAN : « acheter » ou « renforcer », PVN : « vendre « ou « alléger »,PAE : « acheter », PVE : « vendre », PAR, révisions à la hausse, PVR, révisions à la baisse.

A3

Tableau A2. Evolution du nombre différents de titres total dans les portefeuilles

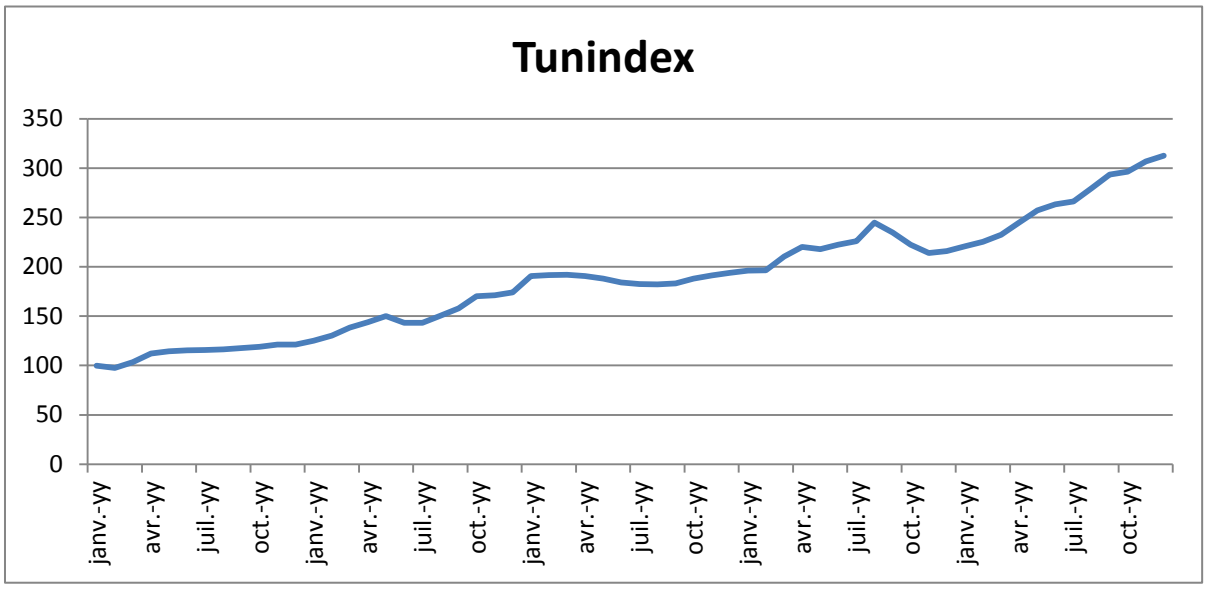
	PAN	PVN	PAE	PVE	PAR	PVR		PAN	PVN	PAE	PVE	PAR	PVR
janv-05	12	7	12				juil-07	26	18	17	7		4
févr-05	12	7	12				août-07	28	19	17	8	3	2
mars-05	12	7	12				sept-07	27	17	18	6	5	6
avr-05	14	7	14		1		oct-07	26	16	18	6	4	1
mai-05	15	7	15				nov-07	28	15	18	6	4	1
juin-05	15	7	15				déc-07	28	15	18	5	4	2
juil-05	15	7	15				janv-08	34	18	22	4	8	2
août-05	15	7	15				févr-08	33	18	22	4	2	4
sept-05	15	7	15			1	mars-08	33	19	22	4		2
oct-05	15	7	15				avr-08	34	19	23	4	1	3
nov-05	15	7	15				mai-08	36	16	22	4	8	7
déc-05	15	7	15				juin-08	36	16	22	4		0
janv-06	15	7	15				juil-08	35	14	22	4	6	6
févr-06	15	7	15				août-08	36	14	23	4	3	2
mars-06	15	7	15				sept-08	35	13	24	4	6	2
avr-06	15	7	15				oct-08	36	13	21	4	5	10
mai-06	21	14	21	6			nov-08	35	14	21	5	2	3
juin-06	23	13	23	4	5		déc-08	35	15	20	5	4	6
juil-06	26	13	26	5	4	2	janv-09	36	18	22	6	3	2
août-06	26	15	26	6		3	févr-09	35	17	21	6	5	6
sept-06	22	13	22	6	5	4	mars-09	35	17	21	6	2	8
oct-06	22	18	22	7	3	6	avr-09	36	17	21	6	2	1
nov-06	21	18	20	9	1	10	mai-09	33	16	21	6	9	7
déc-06	21	16	20	8	4	3	juin-09	35	15	21	6	3	2
janv-07	21	17	17	8		6	juil-09	38	14	21	4	10	14
févr-07	27	15	16	9	18	11	août-09	35	14	19	10	11	10
mars-07	26	16	17	9	2	4	sept-09	36	15	19	10	5	1
avr-07	26	15	18	8	3	1	oct-09	37	14	20	10	3	1
mai-07	25	14	17	8	6	2	nov-09	37	16	20	9	10	5
juin-07	27	15	18	7	8	5	déc-09	37	14	19	9	3	1

PAN : « acheter » ou « renforcer », PVN : « vendre « ou « alléger »,PAE : « acheter », PVE : « vendre », PAR, révisions à la hausse, PVR, révisions à la baisse.

A4 Revision distribution conditional on the initial level

	downgrade	upgrade
StrongSell	0,0%	6,8%
Sell	5,0%	27,7%
Hold	27,4%	46,6%
Buy	30,8%	18,9%
StrongBuy	36,8%	0,0%

A5 Evolution of the Tunisian Market Index



A6 Corrélation des rentabilités anormales cumulées avec les rentabilités cumulées de TUNINDEX

	AR1			AR2		
	Niveaux	Extrêmes	Révisions	Niveaux	Extrêmes	Révisions
Acheteur	-0,16042337	-0,62544564	0,87077056	-0,23991442	-0,69031043	0,8023743
Vendeur (-)	0,90660029	0,94621049	-0,64547653	0,8534053	0,85130562	-0,73748851
Mixte	0,90785922	0,94812837	0,65495263	0,84785537	0,64891527	0,23776146

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