BOHR International Journal of Finance and Market Research
2022, Vol. 1, No. 1, pp. 23–37
DOI: 10.54646/bijfmr.2022.05
www.bohrpub.com

METHODS

Emerging stock markets and performance of IPOs: An application to the regional stock exchange (RSES)

Messomo Elle Serge[1], Manetsa Eloge Lord[2*], Dadem Kemgou Edouard Guilaire[3*] and Nzongang Joseph[2*]

[1]Department of Economics and Management Sciences, University of Buea, Buea, Cameroon
[2]Department of Finance and Accountancy, University of Dschang, Douala, Cameroon
[3]Department of Banking and Finance, University of Bamenda, Douala, Cameroon

***Correspondence:**
Manetsa Eloge Lord,
manelord@yahoo.fr
Dadem Kemgou Edouard Guilaire,
dadem.edouard@yahoo.fr
Nzongang Joseph,
jnzongang@yahoo.fr
The journal of entrepreneurial finance

Received: 13 February 2022; **Accepted:** 19 March 2022; **Published:** 28 March 2022

The aim is to determine the short-term profitability of IPOs and to surrounding the evolution of this profitability on the middle/long run. Therefore, we used the raw initial returns and the adjusted initial returns methods to assess the short-term performance. We determined the long-term performance through the cumulative abnormal returns and the buy-and-hold abnormal returns, abnormal returns being adjusted to the market index and to the market model. By applying those methods to the eleven IPOs' made on the RSES from 16th September 1998 to 31st December 2011, we drawn two main conclusions. First of all, our results reveal that RSES's IPOs present a great initial underpricing during this period and that, the adjustment of initial returns to market index negatively affected them. Then, the holding of these stocks on the middle/long run lead to their underperformance compared to the market portfolio. However, the long-term performance with buy-and-hold abnormal returns (BHARs) is less deteriorated than the one with cumulative abnormal returns (CARs). Those results imply that, buying IPOs at the offer price is profitable to investors in the short run and the holding of those stocks in the middle and long run must be done through the buy-and-hold investment strategy.

Keywords: IPOs, underperformance, sustainability, market

1. Introduction

1.1. Study context

Over the past two decades, Africa in general and Sub-Saharan Africa (SSA) in particular have experienced the proliferation of stock exchanges (Allen et al., 2011). Whereas before 1989 Africa had eight stock exchanges [including five in SSA and three in North Africa] (Ordera, 2012), this number increased to nineteen in 2007 (Yartey and Adjasi, 2007) and twenty-six in 2008 (1). Kenny and Moss (2) perceive the massive creation of stock exchanges in Africa as an instrument and a symptom of the process of economic reform underway on the African continent. According to them, functional financial markets are a channel for building confidence between businesses and investors and an indicator of the importance that the States attach to the private sector. Consequently, the financial markets enhance the functioning of the national financial system in general and that of the capital market in particular.

For Yartey and Adjasi (Yartey and Adjasi, 2007), the establishment of stock markets in Africa aims to move toward economic liberalization in the hope of increasing the quantity and quality of investment. They show, among other things,

that the stock exchanges have contributed significantly to financing the growth of large companies in certain African countries such as Ghana, South Africa, Zimbabwe, and Mauritius. According to Bayala (3), the proliferation of stock exchanges in Africa in recent years is far from being a fashion phenomenon because the economic issues that underlie it are real and relevant. In fact, according to him, states and communities see it as an adequate means of mobilizing and allocating savings on the one hand; companies and investors find in the new stock exchanges a means of investment and financing in line with needs hitherto unmet on the other hand.

However, Yartey and Adjasi (Yartey and Adjasi, 2007) note that the rapid expansion of stock markets in Africa does not mean that even the most developed African market is mature. In reality for Ordera (Ordera, 2012), the indicators of development of these markets show that the African stock exchanges are small; there are in particular some listed companies with a low market capitalization. He also notes that transactions in most of these markets are carried out on a few securities which represent the bulk of total market capitalization. Furthermore, according to him, the coordination and control exercised by the regulatory authorities are far from adequate; which leads among other things to serious information deficiencies. Overall, according to Afego (1), most of the challenges of stock markets in Africa emanate from the myriad of challenges of African economies in general:

illiquidity is maintained across the continent by investors who are mostly ill-informed and have a weak stock market culture; they view the holding of securities in the same way as land ownership (that is, as long-term investments); thus, they do not follow the market and do not trade regularly:

- The general public has very little awareness of how the market works and the procedures for participation;
- the ineffectiveness of the regulatory, informational and operational systems undermines the effectiveness of contract strengthening and the settlement of transactions;
- Despite the improved political and economic environment in most countries, popular perception is that it remains very volatile.

While it is true that the creation of the RSES was based on the need to overcome funding constraints, the observations of Asea (2004) are no less relevant. For him, the problem that arises with the RSES is the domination of trade by Ivorian companies (companies from other member countries have not fully embraced trade). He concludes that the establishment of a regionally integrated stock exchange does not necessarily mean that it will be effectively used or that it will fully integrate into the markets. This conclusion is reinforced by the following two observations: from 16 September 1998 until 31 December 2011.

- The number of companies listed on the RSES remained very low: it fluctuated between 36 (1 occurrence), 38 (4 occurrences), 39 (6 occurrences), 40 (1 occurrence), and 41 (1 occurrence);
- The RSES only registered eleven new listed companies, including five Ivorian companies.

Thus, the jagged development of the small number of listed companies and the small number of new IPOs on the RSES give rise to serious questioning about this first regional experience in general and particularly on the stock market behavior of new securities. Listed Hence the appropriateness of the investigations on the theme "*Emerging Stock Markets and Performance of IPOs: an application to the Regional Stock Exchange (RSES).*"

1.2. Research issues

The debate over IPOs has long crystallized around the determinants of the IPO decision. For Pagano et al. (4) is one of the most important and least studied questions in corporate finance on the one hand. According to them, the finance writings are limited to describing the institutional aspects of the IPO decision without providing the essential factors that determine it on the other hand.

Furthermore, Bharath and Dittar (2006), in addition to considering the IPO as the most important event in the development of a business evolving in the private sphere, find this operation so complex that no single theory can integrate all its facets. Thus, according to them, the explanation of the listing decision can only be envisaged from the multitude of theories relating to this subject. They add in particular that this decision is based on a compromise between the benefits and the costs of the operation. That said, it obviously appears that a company will only launch an IPO as soon as the expected benefits exceed the expected costs. So far the debate seems much focused on the candidate company for the IPO when in reality it is not the only player at stake.

This is why Bayala (3) is part of an approach to the IPO debate based on the actors of the process, namely, the company and its shareholders, the financial, accounting, legal and stock market professions and investors. The shareholders aim to maximize the capital gains from the sale (through the total or partial sale of their shares); the presence on the coast gives the candidate company inexpensive financing opportunities and notoriety among others. The accounting and financial stock market professions, on the other hand, have a good reputation, large commissions and are prompting new IPOs. It appears that apart from the investors, the other actors in the process immediately get their satisfaction in the success of the IPO. Investors, on the other hand, wait for the post-IPO period to potentially benefit from their investments; still they need to get a significant amount of titles.

It therefore seems obvious that successfully completing the IPO is not an end in itself, but a precedent that fundamentally determines future IPOs and issues of company securities that would contribute to the sustainability of the market. The desire for success shared by the issuer and its various advisers would not be continually fulfilled in the absence of a large base of active investors. Said investors only permanently ask for the securities if the previous investments have borne fruit. It is therefore necessary to study the profitability of IPOs on the RSES. In other words, it is a question of determining the capital gains (or losses) reaped by the investors of the IPOs on the RSES as well in the short as in the medium and long term. Thus, our problem comes down to the following main question:

✓ Do investors profit from their investments in IPOs on the RSES?

Two specific questions arise from this:

- What is the level of profitability of short-term IPOs on the RSES?
- How is this profitability evolving in the medium and long term?

1.3. Research objectives

This study aims to study the profitability of IPOs on the RSES in the short as well as in the medium and long term. It will specifically deal with:

✓ Determine the profitability of IPOs during their first trading sessions on the BRVM;

✓ Determine the evolution of the profitability of IPOs in the medium and long term on the RSES.

1.4. Research hypotheses

From the existing literature, the following hypotheses have been formulated.

- Investors make significant profits during the first IPO trading sessions on the RSES;
- Investors are experiencing a considerable deterioration in the profitability of IPOs in the medium and long term on the RSES.

2. Literature review

2.1. Presentation of some theories relating to the IPO

They are essentially based on the informational asymmetry between the parties involved. It is mainly about adverse selection, moral hazard and signaling, over-reaction, and pseudo timing of the market.

2.1.1. The adverse selection

This idea is developed by Akerlof (5). The latter relies on the US auto market to link quality and uncertainty. For him, there are four types of cars: first-hand and used cars on the one hand and good and bad cars (known as "lemons" in the United States) on the other. A first-hand car may be good or bad, just like a used car. The buyer of a car does not immediately know whether it is of good or poor quality. Assuming that p is the proportion of good cars on the market, and q = 1–p is that of bad cars, the buyer can get an idea a priori of the probability according to which his car can be good or bad quality, respectively. Only using the car for a certain period of time will allow the owner to get a better idea of the quality of his vehicle. Thereafter the owner can assign new, more realistic probabilities of completion to each event (the car is good or not).

2.1.2. Moral hazard and signaling

According to Leland and Pyle (6), information asymmetry is very pronounced in the financial market. In this context, insiders know the quality of the projects for which they are seeking funding, unlike outsiders, for whom it is very expensive or even impossible to verify the exact characteristics of said projects. As long as insiders can benefit from the dissemination of positive information about their projects, moral hazard prevents them from honestly transferring all information to other market players. The market value therefore reflects the average quality of the projects; if the market places and average value greater than the average project costs, the supply of mediocre projects will increase considerably.

2.2. Performance of IPOs: a synthesis of previous work

2.2.1. Undervaluation of the offer price

✓ The finding of undervaluation

The pioneering work of Ibbotson (1975) explicitly points out that IPOs achieve positive initial returns due to undervaluation. Subsequent studies in the United States and in various countries around the world have revealed that these initial gains are not unique to the United States, but represent a phenomenon of international scope (Chaouani, 2009). This most famous feature of the IPO process is noticeable on all stock markets, although its extent varies from country to country [Kiymaz (1999) and Ritter (1998)].

✓ Measures of undervaluation

- Gross initial returns

Undervaluation is the difference between the price at which the security is immediately traded on the market (Ljungqvist, 2004) or the equilibrium price (Gajewski and Gresse, 2006) and the offer price divided by the offer price.

$$U = \frac{PE - PO}{PO} = \frac{PE}{PO} - 1 = ln\left(\frac{PE}{PO}\right)$$

With:

PE exchange price or equilibrium price;

PO offer price.

For Ljungqvist (2004), the extent of the undervaluation can be completely determined at the end of the first day of trading in developed capital markets and in the absence of restrictions on the extent of acceptable price movements. But according to him, the equilibrium price generally takes a long time to establish itself in underdeveloped markets (or in the presence of restrictions on daily price volatility); in this case, it is preferable to measure the undervaluation over a relatively wider "time window". According to him, this is even more necessary in markets where there is a time lag between the fixing of prices and the start of trade such as in Taiwan and Finland.

- Adjusted gross yields

Gajewski and Gresse (2006) identify three adjustment methods used in the literature:

The initial yield adjusted to the yield of the market index:

$$U_m = \frac{PE - PO}{PO} - \frac{I_1 - I_0}{I_0} = \frac{PE}{PO} - \frac{I_1}{I_0} = ln\left(\frac{PE}{PO}\right) - ln\left(\frac{I_1}{I_O}\right) = U - \left(\frac{I_1}{I_0}\right)$$

I1 is the closing index for the market on the first day and I0 is the opening index for the same day (closing index for the previous day).

❖ Initial return adjusted for systematic risk:

$$U_s = \frac{PE - PO}{PO} - \beta\frac{I_1 - I_0}{I_0} = U - \beta ln\left(\frac{I_1}{I_0}\right)$$

Where β is the systematic risk of the security

-The gross return adjusted to that of a benchmark portfolio:

$$U_P = \frac{PE - PO}{PO} - R_p = U - R_p$$

Where R_p is the performance of the benchmark portfolio

Gajewski and Gresse (2006) review the empirical work on the undervaluation of IPOs in Europe, it emerges that:

✓ the most used measures are U and Um and the calculations are made after one, five, seven, and thirty day (s) or at equilibrium;

✓ assuming that market movements are too small to significantly influence returns, most studies use the gross initial returns method, with the first closing price as the equilibrium price;

✓ the most widely used adjusted returns method is Um under the implicit assumption that the standardized systematic risk is one; however, adjusted yields are preferred when the period between the date of the first listing and the date of determination of the first equilibrium price is long (Perier, 1996):

✓ the limits of the second adjustment model (Us) lie in the difficulty and bias of estimating the systematic beta risk (Kooli, 2000). Despite these limitations, this method can be interesting since the beta of the securities is in most cases different from that of the market portfolio. Therefore, the adjustment of the initial returns can also be done by the method of cumulative abnormal returns.

- Cumulative abnormal returns

Aktas et al. (7), in a study conducted on the Istanbul stock market, determine the adjusted returns by the event study methodology. To identify short-term performance, they look at the cumulative abnormal returns of one, seven, and fifteen day (s). This method will be used below among the long-term performance measures. The nuance is that here the periodicity is the day while lower it will be the month.

❖ Explanations for the undervaluation

- Hypothesis of the information superiority of certain investors over the issuing company

This theory is highlighted by Hanley (8) in what she described as a phenomenon of partial price adjustment. For her, book building allows not only to extract information, but also to increase the offer price in return, although the price is expected to rise from the start of the trade. It notes in particular a positive correlation between the degree of price adjustment and the level of initial yields. The opinion of Benveniste and Spindt (1989) is confirmed by Hanley and Wilhelm (1995) and by Cornelli and Goldreich (2001) who note a strong institutional allocation of the most attractive IPOs.

Aggrawal et al. (2001) question this theory, because for them book building does not fully explain the excess returns garnered by institutional investors. Rajan (2004) for his part notes that institutional investors do not always capture post-IPO returns because of the rationing that they can also undergo.

• Assumption of information superiority of the issuer over investors

Here, insiders hold private information about the exact value of their business. In this situation, moral hazard exposes potential investors to a risk of adverse selection. It is then that insiders send signals to outsiders with large sums

TABLE 1 | International evidence of long-term underperformance of IPOs.

Country	Author (s)	Number of IPOs	Years of broadcasts	Yield total abnormal
Germany	Ljungqvist	145	1970–1990	−12.1%
England	Levis	712	1980–1988	−8.1%
Australia	Lee, Taylor et Walter	266	1976–1989	−46.5%
Austria	Aussenegg	57	1965–1993	−27.3%
Brazil	Aggrawal, Leal et Hernandez	62	1980–1990	−47.6%
Canada	Jog et Srivistava	216	1972–1993	−17.9%
Chile	Aggrawal, Leal et Hernandez	28	1982–1990	−23.7%
Korea	Kim, Krinsky et Lee	169	1985–1988	De +80.63% à +91.59%
United States	Loughran et Ritter	4753	1970–1990	−20.0%
Finland	Keloharju	79	1984–1989	−21.0%
Japan	Cai et Wei	172	1971–1990	−27.0%
Malaysia	Corhay, Stanley et Alireza	258	1992–1996	+41.71%
Singapore	Hin et Mahmood	45	1976–1984	−9.2%
Sweden	Loughran, Ritter et Rydqvist	162	1980–1990	+1.2%
Tunisia	Bennaceur	16	1989–2006	−22%
WAEMU	Bayala	6	1998–2001	−31.17%

TABLE 2 | Evolution of price differences compared to the offer price from the first to the sixth trading session (in percentage).

Meeting	SNTS	SIVC	PALC	ABJC	NEIC	BOAB	BOAN	ETIT	ONTBF	BOAC	BOABF	Moyenne	Ecart-type
Session 1	12.82	66.58	33.33	14.29	15.38	7.23	21.24	20.48	6.44	24.20	24.20	22.38	15.88
Session 2	12.82	79.00	33.33	7.14	15.38	7.23	21.21	20.48	6.44	24.20	30.43	23.43	19.64
Session 3	17.95	92.42	33.33	7.14	15.38	10.71	21.21	38.55	6.44	24.20	30.43	27.07	22.97
Session 4	12.82	99.83	5.58	7.14	15.38	14.29	21.21	38.55	6.44	24.20	28.26	24.88	25.59
Session 5	17.95	84.92	0.00	7.14	15.38	14.29	21.21	38.55	11.12	24.20	29.57	24.03	21.73
Session 6	17.95	84.92	0.00	7.14	15.38	14.29	21.24	71.08	11.11	24.20	30.00	27.03	25.41
Session 7	12.82	58.33	0.00	7.14	15.38	14.29	21.24	83.53	11.11	24.20	29.57	25.24	23.48
Session 8	17.95	46.50	-0.17	7.14	7.69	14.29	33.33	83.53	11.11	24.20	30.39	25.09	22.56
Session 9	12.82	35.58	0.00	7.14	7.69	14.29	27.27	111.65	11.11	30.43	30.43	26.22	29.18
Session 10	12.82	45.75	0.00	7.14	7.69	14.30	21.21	127.31	11.11	30.43	34.78	28.41	33.86
Session 11	12.82	56.67	0.00	2.14	7.69	16.07	27.27	110.44	11.11	30.43	34.78	28.13	30.44
Session 12	17.44	68.42	0.00	2.14	7.69	14.29	27.27	94.78	11.11	30.43	34.78	28.03	27.95
Session 13	12.82	66.58	0.00	7.14	7.69	14.29	27.27	94.78	11.53	30.43	35.22	27.98	27.51
Session 14	12.82	66.33	0.00	7.14	7.69	14.29	27.27	94.78	11.53	30.43	35.22	27.96	27.48
Session 15	17.44	58.25	0.00	7.14	7.69	14.29	27.27	54.62	11.11	30.43	35.22	23.95	18.39
Average	14.80	67.34	7.03	6.95	11.28	13.23	24.45	72.21	9.92	27.11	31.55	25.99	22.08
Standard deviation	2.43	17.57	13.23	2.59	3.84	2.56	3.74	33.56	2.10	3.11	3.18	7.99	/

Author"s construction from the BRVM database

of money left on the table, because undervaluation leaves investors with "good taste" (Ritter, 1998). This allows issuers to follow a dynamic issuance strategy, selling the securities of subsequent issues at a relatively and abnormally higher price.

• Hypothesis of information asymmetry between the issuer and the banker: the agency model

Baron (1982) poses an agency problem between the advisory banker and the issuing company. The bank (agent) takes advantage of its informational advantage to exert less marketing efforts when its efforts are not observable and verifiable: the bank as the agent of the (principal) issuer is in a situation of moral hazard (Ljungqvist, 2004). The banker takes advantage of his relatively consistent knowledge of market conditions to undervalue securities in order to provide less marketing efforts and gain a good image with investors in general [Beatty and Ritter (9) and Ritter (1998)], and its own customers in particular (Cornelli and Goldreich, 2001). These advantages of the banker are mitigated by Boehmer and Fishe (2000) for whom the undervaluation benefits both the banker and the

issuer because it promotes activity and liquidity in the post-IPO market.

2.3.2. Medium and long-term under performance

• The existence of medium and long-term underperformance

A problem often noted in the performance of IPOs is the existence of abnormally high yields in the short term and abnormally low in the medium and long term (10); in the long term, IPOs seem to be overvalued (Ritter, 1991). According to Espelaud et al. (1999), long-term underperformance has become a center of particular interest, especially since it is not unanimously accepted by the authors (Chaouani, 2009). While the phenomenon is well established in the American market, this is not necessarily the case in Europe (Gajewski and Gresse, 2006). This perception is shared by Ritter (1998). This is illustrated in **Table 1** below.

• Methods for determining medium/long-term profitability

In the literature, the event study methodology is used for determining long-term performance. This requires the calculation of the abnormal returns, the determination of the expected returns and the calculation of the Student's t statistic for the significance tests on the abnormal returns.

- Calculation of abnormal yields

According to Barder and Lyon (1996), the convention in most studies on abnormal returns is the summation of daily or monthly returns over time. The abnormal return on security i in month t am then given by:

AR_{it} $R_{it} - -E\,(R_{it})$

With:

R_{it}, the return on security i in month t; and

E (R_{it}), the normal (or expected) return on security i in month t.

The accumulation of abnormal returns over T-month gives the Cumulative Abnormal Return (CAR) as follows:

$$CAR_{iT} = \sum_{t=1}^{T} AR_{it}$$

In addition, the difference between the purchase-conservation yield of security i on T-month and the expected (or expected) purchase-conservation yield of security i on T-month, gives the Abnormal Return Buy-and-Hold (BHAR) according to the following equation:

$$BHAR_{iT} = \prod_{t=1}^{T} [1 + R_{it}] - \prod_{t=1}^{T} [1 + E\,(R_{it})]$$

- Determination of abnormal yields based on expected return models

Kothari and Warner (1997) present four models generally used to estimate abnormal returns on securities: the market index, the market model, the Capital Asset Pricing Model (CAPM) and the three-factor model of Fama and French (11).

- Abnormal performance according to the Market-Adjusted Model

The abnormal return on security i in month t adjusted according to the market index is given by:

$$MAR_{it} = R_{it} - R_{mt}$$

With: R_{it}, the return on security i in month t; andR_{mt}, the performance of a market index in month t.

- Abnormal performance according to the Market Model

The abnormal return on security i in month t according to the market model is given by:

$$MMAR_{it} = R_{it} - \alpha_i - \beta_i R_{mt}$$

With α_i and β_i the parameters estimated by regressing the monthly returns of security i on the monthly returns of a benchmark.

Abnormal performance following CAPM

The abnormal return on security i adjusted according to the CAPM in month t is:

$$CAPMAR_{it} = R_{it} - R_{ft} - \beta_i \left[R_{mt} - R_{ft}\right]$$

Avec β_i estimé à partir du CAPM [c'est-à-dire, de la régression de $(R_{it} - R_{ft})$ sur $(R_{mt} - R_{ft})$].

- Following the three-factor model of Fama and French

The abnormal return on security i at month t adjusted according to the tri-factorial model is:

$$FFMAR_{it} = R_{it} - R_{ft} - \beta_{i1} \left[R_{mt} - R_{ft}\right] - \beta_{i2} HML_t - \beta_{i3} SMB_t$$

Where β_{i1}, β_{i2} and $\beta_{i3}$are estimated by the regression of the excess monthly returns of the title i on the excess monthly returns of the market portfolio, the book-to-market (HMLt) and the size factor (SMBt).

- Student's conventional t-statistic

It is used both for CARs and for BHARs.

$$t = \frac{\overline{AR}_T}{\sigma(AR_T)/\sqrt{n}}$$

With:

$\overline{AR}_T$ The average of the abnormal returns; and $\sigma\,(AR_T)$ is their standard deviation for the n-titles of the sample.

- Skewness-adjusted t-statistics

Barber and Lyon (1997) note that the purchase-conservation yields are positively imbalanced and this positive imbalance biases the t-statistics. Hence the use of the adjusted t statistic when yields are based on the conservation purchase method.

$$t_{sa} = \sqrt{n}\left(S + \frac{1}{3}\widehat{\gamma}S^2 + \frac{1}{6n}\widehat{\gamma}\right)$$

TABLE 3 | Amounts of money left on the table from gross initial yields.

Actions	Offer price	Number of shares	Undervaluation rate	Amounts of money left on the table
SNTS	19,500	2,766,000	14.80%	7,982,676,000
SIVC	6,000	184,879	67.34%	746985111.6
PALC	6,000	/	7.03%	/
ABJC	7,000	117,504	6.95%	57,165,696
NEIC	6,500	67,000	11.28%	49,124,400
BOAB	28,000	6,000	13.23%	22,226,400
BOAN	16,500	20,970	24.45%	84598222.5
ETIT	1,245	156,020,773	72.21%	1.40265E+11
ONTBF	45,000	680,000	9.92%	3,035,520,000
BOAC	23,000	117,826	27.11%	734680457.8
BOAF	23,000	100,000	31.55%	725,650,000
Total	/	/	/	1.53704E+11

TABLE 4 | Evolution of share price spreads on the offer price adjusted to the RSES composite index.

Meeting	SNTS	SIVC	PALC	ABJC	NEIC	BOAB	BOAN	ETIT	ONTBF	BOAC	BOABF	Moyenne	Ecart-type
Session 1	11.37	64.44	33.19	14.23	15.64	6.70	18.42	20.45	6.36	23.58	24.06	21.67	15.49
Session 2	11.37	76.85	33.19	7.08	15.64	6.70	18.39	20.45	6.36	23.58	30.30	22.72	19.24
Session 3	16.50	90.27	33.19	7.08	15.64	10.18	18.39	38.52	6.36	23.58	30.30	26.36	22.59
Session 4	11.37	97.69	5.44	7.08	15.64	13.75	18.39	38.52	6.36	23.58	28.12	24.18	25.16
Session 5	16.50	82.77	-0.15	7.08	15.64	13.75	18.39	38.52	11.04	23.58	29.43	23.32	21.30
Session 6	16.50	82.77	-0.15	7.08	15.64	13.75	18.42	71.05	11.02	23.58	29.86	26.32	25.12
Session 7	11.37	56.19	-0.15	7.08	15.64	13.75	18.42	83.50	11.02	23.58	29.43	24.53	23.37
Session 8	16.50	44.35	-0.31	7.08	7.95	13.75	30.51	83.50	11.02	23.58	30.25	24.38	22.36
Session 9	11.37	33.44	-0.15	7.08	7.95	13.75	24.45	111.62	11.02	29.82	30.30	25.51	29.19
Session 10	11.37	43.60	-0.15	7.08	7.95	13.77	18.39	127.28	11.02	29.82	34.65	27.71	33.90
Session 11	11.37	54.52	-0.15	2.08	7.95	15.54	24.45	110.41	11.02	29.82	34.65	27.42	30.36
Session 12	15.98	66.27	-0.15	2.08	7.95	13.75	24.45	94.75	11.02	29.82	34.65	27.33	27.76
Session 13	11.37	64.44	-0.15	7.08	7.95	13.75	24.45	94.75	11.45	29.82	35.08	27.27	27.35
Session 14	11.37	64.19	-0.15	7.08	7.95	13.75	24.45	94.75	11.45	29.82	35.08	27.25	27.32
Session 15	15.98	56.10	-0.15	7.08	7.95	13.75	24.45	54.59	11.02	29.82	35.08	23.24	18.04
Average	13.35	65.19	6.88	6.89	11.54	12.69	21.63	72.18	9.84	26.49	31.42	25.28	21.85
Standard deviation	2.43	17.57	13.23	2.59	3.84	2.56	3.74	33.56	2.10	3.11	3.18	7.99	/

Author's construction from the RSES database.

$$S = \frac{\overline{AR}_T}{\sigma\left(AR_T\right)}, \widehat{\gamma} = \frac{\sum_{t=1}^{n}\left(AR_{it} - \overline{AR}_T\right)^3}{n\sigma(AR_T)^3}$$

With $\widehat{\gamma}$ the skewness coefficient estimator and $\sqrt{n}$ S the conventional t-statistic

3. Methodological approach

3.1. Description of data

The stock market prices and the values of the composite RSES index used in this study come from the RSES database. The other information such as the IPO dates, the offer prices, the number of shares offered, and the first listing dates are derived from public notices issued either by the candidate companies (OPV in particular) for the IPO. On the stock market, either by the RSES or by the "CREPMF." Determining the undervaluation rate that requires the first prices and the quoted offer prices of the shares poses two problems: that of the extent of the calculation window and the offer price to be used in cases where there is 'has more than one. Indeed, the hypothesis of market information efficiency as noted by Fama (12) is rejected in the context of the RSES by Ndong (13). Consequently, the prices of the shares listed on this stock exchange would not quickly integrate all the information available. Thus, at the end

TABLE 5 | Money left on the table from adjusted initial returns.

Actions	Prix d'offre	Nombre d'actions	Taux de sous-évaluation	Sommes d'Argent laissées sur la table
SNTS	19,500	27,66,000	13.35%	7,200,589,500
SIVC	6,000	184,879	65.19%	723135720.6
PALC	6,000	/	6.88%	/
ABJC	7,000	117,504	6.89%	56672179.2
NEIC	6,500	67,000	11.54%	50,256,700
BOAB	28,000	6,000	12.69%	21,319,200
BOAN	16,500	20,970	21.63%	74840881.5
ETIT	1,245	15,60,20,773	72.18%	1.40207E+11
ONTBF	45,000	68,0000	9.84%	3,011,040,000
BOAC	23,000	117,826	26.49%	717878470.2
BOAF	23,000	100,000	31.42%	722,660,000
Total	/	/	/	1.52785E+11

TABLE 6 | Evolution of the cumulative average abnormal returns.

Période	CARs	t_{conv}	CMARS	t_{conv}	t_{corr}
6 Months	−0.1556	−1.8958	−0.0910	−1.6972	−1.6812
12 Months	−0.1836	−1.4841	−0.0782	−1.0436	−1.0288
18 Months	−0.1835	−1.2659	−0.1032	−1.3445	−1.2989
24 Months	−0.3216	−1.6799	−0.1780	−0.8577	−2.0212**
30 Months	−0.4679	−2.3127**	−0.3152	−3.2211*	−2.9434**
36 Months	−0.4765	−2.1572**	−0.3910	−3.7283*	−3.2848*
42 Months	−0.5510	−2.4206**	−0.4307	−4.0133*	−3.3582*
48 Months	−0.6700	−2.8514**	−0.4741	−4.3454*	−3.2687*
54 Months	−0.6595	−2.6840**	−0.5001	−4.4807*	−2.9737**
60 Months	−0.6976	−2.7442**	−0.5703	−5.0340*	−2.8197**

*, ** significant at the threshold of 1 and 5%, respectively (critical values 3.143 and 1.943 respectively).

TABLE 7 | Overall evolution of buy-keep yields and the relative wealth measure.

Période	WR	BHARs	t_{conv}	t_{sa}	MWR	BHMARs	t_{conv}	t_{corr}
6 Months	0.8839	−0.1072	−11.8889*	−12.6415*	0.7953	−0.0552	−12.6182*	4.1704*
12 Months	0.8876	−0.1416	−14.0145*	−43.5390*	0.8077	−0.0659	−19.8061*	−7.1023*
18 Months	0.8688	−0.1842	−12.0796*	−33.2228*	0.8045	−0.0823	−21.2051*	−6.4786*
24 Months	0.8114	−0.2540	−10.8288*	−32.1061*	0.7301	−0.1134	−19.6387*	9.5468*
30 Months	0.7464	−0.2566	−9.0474*	−11.7574*	0.6772	−0.1036	−14.4421*	9.6461*
36 Months	0.7542	−0.21492	−7.6582*	−9.7531*	0.6572	−0.1138	−15.5393*	15.2483*
42 Months	0.7255	−0.3036	−10.8775*	−10.7099*	0.6586	−0.1198	−14.9311*	11.6449*
48 Months	0.6401	−0.4206	−12.2245*	−10.8124*	0.6570	−0.1137	−14.4129*	17.1591*
54 Months	0.6359	−0.4956	−11.2851*	−15.3115*	0.6532	−0.1487	−17.6482*	27.0803*
60 Months	0.6126	−0.4259	−9.1510*	−1.1515*	0.6498	−0.1308	−14.3092*	19.5479*

*Significant at the 1% threshold (3.143 values).

of the first trading day, the prices of shares newly listed on the BRVM would not systematically adjust with all the information available.

This imposes a relatively calculation window for determining the initial yields. This choice is all the more justified by Ljungqvist (2004), who notes that in developed markets and in the absence of restrictions on price fluctuations, the full extent of underpricing can be identified at the end of the first day of trading on securities. On the other hand, in developing markets and in the presence of restrictions on price fluctuations, prices take longer to balance. This is why in the context of this study we use a range of fifteen (15) sessions because at the end of the fifteenth session, six (06) of the eleven titles record the

TABLE 8 | Summary of medium and long term results.

Méthode	Abnormal returns	Student's t-statistic	Conclusion of the test
Cumulative abnormal returns	CARs négatifs	t_{conv} significatifs à 30, 36,42, 48, 54 et 60 mois	Acceptation de H_1
	CMARS négatifs	t_{conv} significatifs à 30, 36,42, 48, 54 et 60 mois	Acceptation de H_1
		t_{sa} significatifs à 24,30, 36,42, 48, 54 et 60 mois	Acceptation de H_1
Buy-and-hold abnormal returns	BHARs négatifs	t_{conv} significatifs à 6, 12, 18, 24,30, 36,42, 48, 54 et 60 mois	Acceptation de H_1
		t_{sa} significatifs à 6, 12, 18, 24,30, 36,42, 48, 54 et 60 mois	Acceptation de H_1
	BHMARs négatifs	t_{conv} significatifs à 6, 12, 18, 24,30, 36,42, 48, 54 et 60 mois	Acceptation de H_1
		t_{sa} significatifs à 6, 12, 18, 24,30, 36,42, 48, 54 et 60 mois	Acceptation de H_1

same price over three successive sessions with exchanges, signifying a relative stabilization of prices. For each of the shares with more than one offer price (SONATEL, ONATEL and BOABF), the highest offer price is used. In addition, the reference price is used for ETIT in place of the offer price which we could not have.

For the determination of long-term yields, the latest monthly prices are used; the actions selected for the study of long-term performance are those that have been at least 5 years on the stock market [or sixty months]. The titles concerned are SNTS, SIVC, PALC, ABJC, BOAB, NEIC, BOAN, and ETIT. The RSES Composite Index (RSES Cp) values are also collected for each month over the study period. These stock prices and the RSES composite index are entered into the Excel spreadsheet for the calculation of 60 monthly returns for each of the shares and 160 monthly returns for the composite indicator.

3.2. Determination of short-term IPO yields

3.2.1. Gross initial yields

This process mentioned by Gajewski and Gresse (2006), and Ljungqvist (2004) is used in particular by Ikoku (1998) and Arosio et al. (2000). Here, the gross initial yield (Uit) of share i on day three after the IPO am given by the following equation:

$$U_{it} = \frac{P_{it} - PO_i}{PO_i} = \frac{P_{it}}{PO_i} - 1 = ln\left(\frac{P_{it}}{PO_i}\right)$$

With:

U_{it} The gross initial yield of the action i on day t

P_{it} the listed share price i on day t

PO_i Share offer price i.

3.2.2. Gross returns adjusted to the market index

This method has the advantage of taking into account the normal return (a benchmark or a benchmark portfolio) in determining the rate of undervaluation of the securities. Thus, the gross returns of share i adjusted to the market index are determined by the following relationship:

$$U_{ait} = \frac{P_{it} - PO_i}{PO_i} - \frac{I_1 - I_0}{I_0} = \frac{P_{it}}{PO_i} - \frac{I_1}{I_0}$$

With:

Had the gross return on equity i adjusted to the market index on day t

P_{it} The share price i on day t;

PO_i The offer prices of the share i;

I_0 The market opening index on the day of introduction;

I_1 The market closing index on the day of introduction.

3.3. Determination of medium and long term yields

3.3.1. The cumulative abnormal returns

The abnormal cumulative returns determined according to the market index will be distinguished from those determined according to the market model.

3.3.1.1. Step 1: calculating gross monthly returns. It's about determining the gross monthly stock return as well as the market index.

Gross monthly returns on share i in month t (R_{it})

Gross monthly stock returns are determined from the following relationship:

$$R_{it} = \frac{P_{it} - P_{i,t-1}}{P_{i,t-1}}$$

With:

Pit the share price i at month t;

$P_{i,t-1}$ The share prices i in month t – 1;

• Gross monthly returns of the market index (R_{mt})

The gross monthly returns of the market index are determined from the following relationship:

$$R_{mt} = \frac{I_t - I_{t-1}}{I_{t-1}}$$

With:

It is the market closing index for month t;

I_{t-1} The market closing index for month t – 1.

3.3.1.2. Step 2: Determination of market-adjusted abnormal returns (AR_{it}). According to Kothari and Warner (1997), equity returns can be adjusted to the market index. Thus, the return adjusted to the stock market index i in month t am given as follows:

$$AR_{it} = R_{it} - R_{mt}$$

With:

R_{it} The gross return on share i in month t

R_{mt} The gross return of the market index in month t

3.3.1.3. Step 3: Calculate Average Adjusted Monthly Returns. The monthly stock returns are obtained by the simple arithmetic average of the adjusted monthly returns of the different stocks in the sample according to the following relationship:

$$\overline{AR}_t = \frac{1}{n}\sum_{t=1}^{n} AR_{it}$$

With:

$\overline{AR}_t$ The average abnormal return of the n shares of the sample in month t;

AR_{it} The abnormal returns of the action i at month t;

n Represents the number of actions in the sample.

3.3.1.4. Step 4: Determination of the cumulative monthly abnormal returns. The cumulative abnormal profitability of the actions between month q and month s is given by the following relationship:

$$CAR_{q,s} = \sum_{t=q}^{s} \overline{AR}_t$$

Thus, the abnormal cumulative profitability of the n actions in the sample between the first month and the Tenth month is given by the following relationship:

$$CAR_{1,T} = \sum_{t=1}^{T} \overline{AR}_t$$

3.3.1.5. Step 5: Determination of student's t-statistic. The t statistic is calculated by dividing the average of the abnormal cumulative returns by the standard deviation of the average monthly abnormal returns, as indicated by the following relationship:

The null hypothesis assumes that the average abnormal cumulative returns are zero

$$H_o : CAR_{1,T} = 0$$

$$t_{CAR_{1,T}} = \frac{CAR_{1,T}}{\sigma\left(\overline{AR}_t\right)\sqrt{n_t}}$$

With:

CMAR1, T the cumulative abnormal average returns of the shares over the first T-months;

n_t The number of IPOs in month t;

$\sigma\left(\overline{AR}_t\right)$ The standard deviation of the average abnormal monthly returns;

$\left(\overline{AR}_t\right)$ for the n stocks in the sample

Unlike Warner and Kothari (1997) who recommend estimating standard deviations from pre-event data, Barber and Lyon (1997) think that this recourse intensifies the bias of new introduction. In addition, in the context of IPOs there is no pre-event stock market data. Thus the statistic t will be calculated according to the formulation used by Ritter (1991), Miloud (2002), and Kooli and Suret (2001):

$$t_{CAR_{1,T}} = \frac{CAR_{1,T^*}\sqrt{n_t}}{\sqrt{\left[t^* Var + 2^*(t+1)^* Cov\right]}}$$

With:

Var. the mean of the variances of AR_{it} it over the period studied;

Cov. the first-order auto-covariance of $\overline{AR}_t$.

3.3.1.6. Cumulative market model abnormal returns (CMARs). The difference with CARs is in the calculation of normal yields, which also influences the determination of abnormal yields. Indeed, returns adjusted to the market index are based on the implicit assumption that the systematic risk of securities is identical to that of the benchmark. This hypothesis is relaxed by Kothari and Warner (1997) who propose, among other things, the use of the market model for the determination of abnormal returns.

Step 1: Determine the expected (normal) returns of the securities

This step consists of regressing the gross returns of the market index on the gross returns of the securities following the market model proposed by Sharpe (1964). Thus, the return on share i in month t am given as follows:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it}$$

With:

R_{it} The return on share i in month t;

R_{mt} The return on the market index in month t;

α_i The autonomous performance of the security (regardless of the market index) i;

β_i The systematic risk (volatility) of security i relative to the market index;

ε_{it} The error term related to title i for month t.

Step 2: Determine abnormal yields

Abnormal returns are the residuals of the market model. According to Kothari and Warner (1997), the abnormal return on action i at month t am given by:

$$MAR_{it} = R_{it} - \hat{R}_{it} = \varepsilon_{it}$$

With:

MAR_{it} The abnormal monthly return on action i in month t;

R_{it} The gross return on share i in month t;

$\hat{R}_{it}$ The estimated yield of action i in month t.

Step 3: Calculate Average Abnormal Monthly Returns

The monthly stock returns are obtained by the simple arithmetic mean of the abnormal monthly returns of the different stocks from the following relation:

$$\overline{MAR_t} = \frac{1}{n}\sum_{t=1}^{n} MAR_{it}$$

With:

$\overline{MAR_t}$ The average abnormal return of the n shares of the sample in month t;

MAR_{it} Abnormal return on action i at month t;

n Represents the number of actions in the sample.

Step 4: Determine the cumulative abnormal monthly returns

The cumulative abnormal profitability of securities between month q and month s is given by the following relationship:

$$CMAR_{q,s} = \sum_{t=q}^{s} \overline{MAR_t}$$

Thus, the abnormal cumulative profitability of the securities between month1 and month T is given by the following relation:

$$CMAR_{1,T} = \sum_{t=1}^{T} \overline{MAR_t}$$

Step 5: Determination of Student's t-statistic

The null hypothesis assumes that the average abnormal cumulative returns are zero

$$H_o : CMAR_{1,T} = 0$$

$$t_{CMAR_{1,T}} = \frac{CMAR_{1,T}}{\sigma\left(\overline{MAR_t}\right)\sqrt{n_t}}$$

With:

$CMAR_{1,T}$ The abnormal returns accumulated over the first T-months;

$\sigma\left(\overline{MAR_t}\right)$ The standard deviation of the average monthly abnormal returns of the n stocks in the sample.

Specifically, the Student t statistic is defined as follows:

$$t_{CMAR_{1,T}} = \frac{CMAR^*_{1,T}\sqrt{n_t}}{\sqrt{\left[t^* Var + 2^*(t+1)^* Cov\right]}}$$

With:

Var. the average of the variances of MAR_{it} it over the period studied;

Cov the first-order auto-covariance of $\overline{MAR_t}$.

3.4. Abnormal securities returns

The abnormal buy-keep returns for share i on T-month am given by the following equation:

$$BHMAR_{iT} = R_{iT} - \hat{R}_{i,T}$$

$$BHMAR_{iT} = \left[\prod_{t=1}^{T}(1+R_{it}) - 1\right] - \left[\prod_{t=1}^{T}\left(1+\hat{R}_{it}\right) - 1\right]$$

With:

R_{it} The gross monthly return on share i in month t;

$\hat{R}_{it}$ The estimated monthly return on share i in month t.

The following relative wealth measure of Ritter's ratio (1991) is formulated as follows:

$$WMR_i = \frac{\prod_{t=1}^{T}(1+R_{it})}{\prod_{t=1}^{T}\left(1+\hat{R}_{it}\right)}$$

With:

WMR_i Is the relative richness linked to the conservation of the action i over T months;

R_{it} The return on share i in month t;

$\hat{R}_{it}$ The normal return on share i in month t.

The relative wealth linked to the IPO portfolio is given by:

$$WR = \frac{1}{n}\sum_{i=1}^{n} WR_i$$

With n the number of sample IPOs

3.5. Average abnormal buy-keep returns

The average abnormal buy-keep returns of the n_t stocks in the sample for T months are given as follows:

$$BHMAR_T = \sum_{t=1}^{n}\frac{1}{n_t}BHMAR_{iT}$$

3.6. T statistics

The null hypothesis stipulates that the BHMARs for all the companies in the sample over T-months are zero:

$$H_o : BHMAR_T = 0$$

The adjusted t-statistic of skewness proposed by Lyon et al. (1999) is given by:

$$t_{sa} = \sqrt{n}\left(S + \frac{1}{3}\widehat{\gamma}S^2 + \frac{1}{6n}\widehat{\gamma}\right)$$

$$S = \frac{\overline{BHMAR}_T}{\sigma\,(BHAR_T)}, \widehat{\gamma} = \frac{\sum_{t=1}^{n}\left(BHMAR_{it} - \overline{BHMAR}_T\right)^3}{n\sigma(BHAR_T)^3}$$

With γ the skewness coefficient estimator and √n S the conventional t-statistic;

T = 6, 12, 18, 24, 30, 36, 48, 54, 60 months;

$\overline{BHMAR}_T$ The simple arithmetic mean of$BHMAR_T$; ;

σ ($BHMAR_T$)The standard deviation of the $BHMAR_T$calculated according to the different values of T;

n_t number of IPO securities of the period.

4. Presentation and interpretation of results

4.1. Short-term performance results

4.1.1. Gross initial yields

The price differences (compared to the offer prices) per session and per security shown in **Table 2** give rise to various observations.

First of all, with regard to standard deviations, a greater disparity in rate differentials is noted between the different titles over the sessions (minimum 15.38% and maximum 33.86%) compared to the contrast observed of a session to another for the same title (minimum 2.10% and maximum 33.56%). This assessment remains valid with the averages. The rate of undervaluation is very disparate from one action to another (minimum 6.95% and maximum 72.21%) while the gap between the different sessions is not as great (minimum 22.38% and maximum 28.41%).

The fact that the rate of undervaluation in the first session (22%) is not only lower than the average (25.99%), but also the smallest of all underlines the idea that the courses are not adjust quickly; all the more so since the climax was reached at the fifteenth session (28.41%). However, the average rate of undervaluation is significant (25.99%). This evidence is more marked in **Table 2** by the immensity of the sums of money left on the table by issuing companies within the meaning of Ljungqvist (2004).

4.1.2. Initial returns adjusted to the BRVM Composite index

Some of the observations made with the initial gross yields remain valid. Indeed, the standard deviations make it possible to note a greater disparity in rates between the securities during the different sessions (minimum 15.49%; maximum 33.90%) compared to that observed from one session to another for the various securities (minimum 2.1% and maximum 33.56%). The observation of average rates leads to the same observation. The difference between the average rates of undervaluation is relatively very large from one security to another (minimum 6.88% and 72.18%). On the other hand, the variability of the average rates of undervaluation between sessions is relatively lowers (minimum 21.67% and maximum 27.71%).

The initial yield of the first session remains the lowest (21.67%); proof that the price adjustment is not complete on the first trading day the maximum rate is reached after the tenth session and remains high until the fifteenth session. The average rate of undervaluation remains significant even if it goes from 25.99% (with gross initial returns) to 25.28%. This 0.71% change in initial yields may seem small when in reality this is not the case. The shortfall recorded by the issuing companies is also pharaonic with regard to **Table 4** below. However, the difference compared to the total amount of money left on the table observed in **Table 4** (with the gross initial yields) is significant (918,507,395 FCFA). This proves that the adjustment of initial returns by the market index has a strong impact on them.

4.1.3. Interpretation of the initial undervaluation of IPOs on the RSES

The major characteristics of OPVs and the birth context of the RSES make it possible to envisage two complementary and non-exclusive explanations for undervaluation: the hypothesis of undervaluation as a political instrument and the hypothesis of the aversion of the risk of failure.

❖ Assumption of undervaluation as a political instrument

This explanation is based on the fact that the desire to create the RSES was born on the political field (even if later it is reinforced by the financing constraints of companies and local authorities in the WAEMU zone). In addition, this idea is reinforced by the process of economic liberalization initiated by the WAEMU States to tie in with the global movement of the world economy.

Consequently, in the context of the WAEMU marked by a weak active base of investors and a weak stock market culture, certain States (notably Senegal, Ivory Coast, Benin, and Burkina Faso) would have used of undervaluation to give real content to political decisions on the integration of financial markets and economic liberalization. Thus, by leaving large sums of money on the table by the issuing companies, the political actors wanted, among other things, to gain popular support and the emergence of national shareholding in certain cases (notably for SONATEL and ONATEL actions). This idea is further reinforced by the following observations:

- six (06) of the eleven IPOs on the RSES five were made by privatization of parastatal companies;

- the first five IPOs were the culmination of the privatization processes of parastatals;

- Bayala (3) notes that during initial public offerings on the RSES, individual investors were subjected to less severe demand rationing than institutional investors and that foreign investors were the biggest victims of this discrimination. This hypothesis is also supplemented by the second.

❖ Risk aversion failure hypothesis

Faced with the preconditions imposed on the RSES in terms of minimum market capitalization and minimum proportion of capital to be released to the public, the companies applying for the IPO would have considerably reduced the price of shares to reduce the probability of 'failure.

4.2. Medium/long term performance results

4.2.1. The cumulative abnormal returns

The evolution of the abnormal cumulative returns (adjusted according to the market index and the market model) is given in **Table 6** which follows. It turns out that the cumulative abnormal returns are all negative and increase over time. In addition, conventional t-statistics reveal the significance of these abnormal cumulative returns (CARs and CMARs) at 30, 36, 42, 48, 54, and 60 months. The corrected heteroskedasticity t-statistic shows that the cumulative abnormal returns adjusted according to the market model are significantly different from zero at 24, 30, 36, 42, 48, 54, and 60 months. Consequently, the null hypothesis is rejected: the profitability of the shares newly listed on the RSES is significantly degraded compared to all the stocks in the market portfolio.

4.2.2. Abnormal buy-keep returns

Table 7 below shows that the indicators of relative wealth are all lower than one and that the abnormal returns of purchase-conservation are all negative whatever the mode of adjustment (with the market index or the market model) used, which implies a deterioration in the profitability of the IPOs compared to the market portfolio. This underperformance of newly listed shares compared to the market index is certified by conventional t-statistics and skewness-adjusted t-statistics at 6, 12, 18, 24, 36, 42, 48, 54, and 60 months. Hence the rejection of the null hypothesis stipulating the nullity of abnormal buy-keep returns.

It should also be noted that the medium and long term profitability of these securities is less degraded with the abnormal returns of purchase-conservation compared to that determined with the abnormal cumulative returns; this is illustrated by Figures 3, 4 below.

4.2.3. Interpretation of the medium and long-term underperformance of IPOs

The results on the medium and long term performance are summarized in **Table 8** which follows.

Source: Author's construction

The summary in **Table 8** reveals the medium and long-term underperformance of IPOs (compared to the composite RSES index) across all the methods (CARs, CMARs, BHARs, and BHMARs) and statistics used (statistics t_{conv}, t_{corr}, t_{sa}). In fact, the abnormal returns are negative and statistically significant. The deterioration in profitability in the medium and long term can potentially be explained by the hypothesis of a rapid race toward liquidity in a context of illiquid.

Indeed, the high rate of initial undervaluation of newly listed stocks has led to a rapid rise in prices, accentuated by the euphoric demand from investors attracted by the significant initial returns. This euphoria aroused an ardent desire for liquidity among investors tempted by the "good flavor" left by abnormally high yields in the short term. Thus, the massive and rapid rush of investors toward liquidity has given rise to increasingly increasing sell orders leading to a supply of securities far above demand. This superior supply over demand has gradually made IPO titles illiquid. Said illiquidity of securities added to the general illiquidity of the market has led investors wishing to get rid of these titles (which have become increasingly undesirable) to throw more fuel on the fire. In turn, a movement in the opposite direction followed the euphoria of the first trading sessions caused by the rapid rise in prices.

Hence the subsequent drop in share prices whose returns became abnormally negative at the end of the first month of listing. This can be seen in **Figures 1**, **2** above.

In addition, the more marked deterioration in profitability with the abnormal cumulative returns compared to that obtained with the abnormal buy-keep returns seems quite logical in a context characterized by the illiquidity of newly listed securities and the market. Indeed, illiquidity has forced the most active investors (prone to frequent changes in the composition of their portfolios) to suffer more severe losses than passive investors (having adopted the passive strategy of pure investment or buying strategy) conservation).

5. Conclusion and recommendations

5.1. Conclusion

The Phillips-Perron test concluded that all of the yield series were stationary. It was preferred to the Dickey-Fuller augmented test because of its robustness. The Jarque-Bera normality test showed that apart from the SIVC share return series, all the other series of returns used

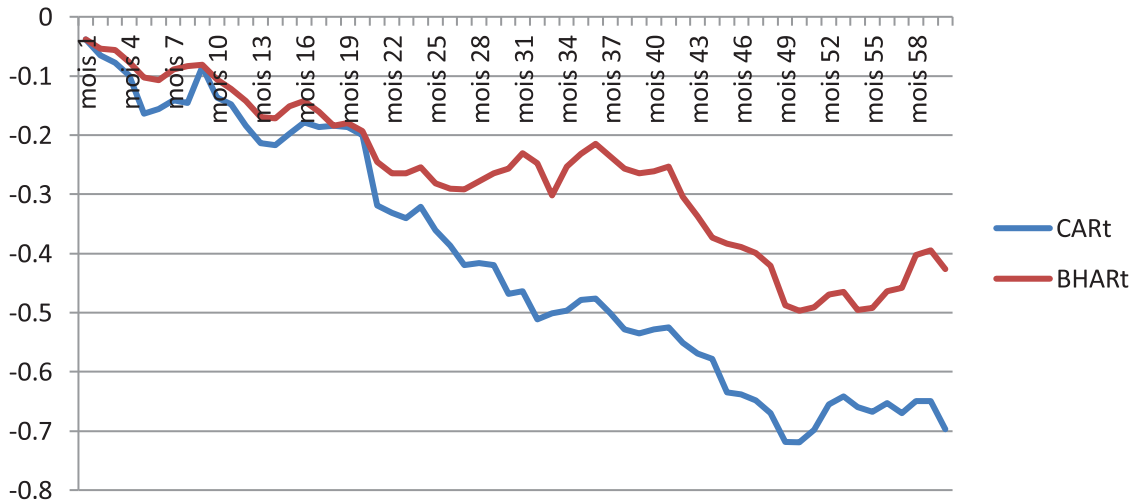

FIGURE 1 | Evolution of cumulative abnormal returns (CARs) and BHARs.

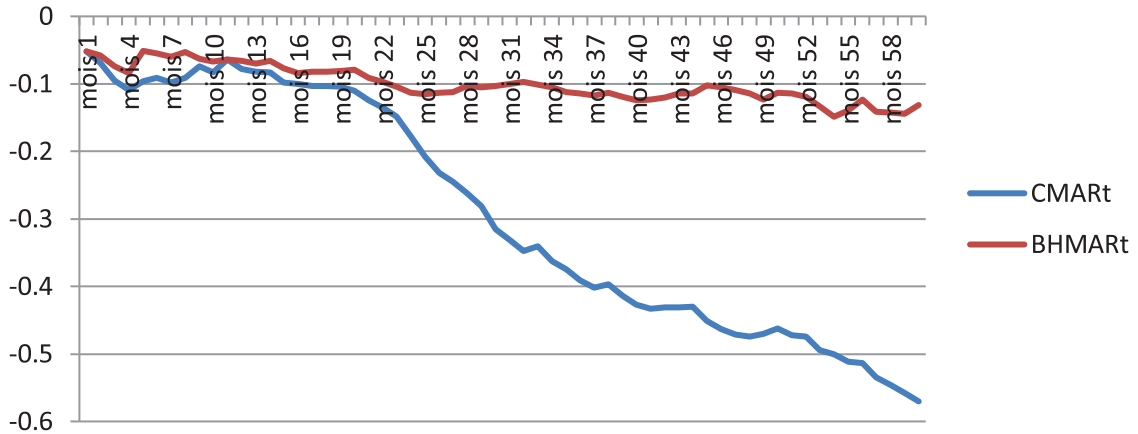

FIGURE 2 | Evolution of CMARS and BHMARs.

in the medium / long term were abnormally distributed. In addition, the heteroskedasticity tests were positive for three titles (SNTS, BOAB, and BOAN). Note that the heteroskedasticity of the BOAB and BOAN stocks is relative to the autocorrelation of the residuals while that of SNTS is caused by a relationship between the residuals (yields determined by market model) and the yields of the market index. Faced with this anomaly (heteroskedasticity) the conditional variances of the residuals of the returns on these stocks were estimated by the GARCH type models.

Subsequently the hypotheses were put to the test of the facts. The results obtained show that investments in IPOs on the RSES between September 16, 1998 and December 31, 2011 allowed investors to record initially high returns and significantly negative abnormal returns in the medium and long term. Indeed the rate of undervaluation and the sums of money left on the table proved to be important according to the two methods used. In other words, investors would have benefited greatly from the price appreciation during the first fifteen sessions after the IPOs. However, the values of these indicators recorded with the gross initial returns method were larger than those calculated using the adjusted initial returns method. This shows that the adjustment by the market index strongly influenced the short-term profitability of IPOs on the RSES.

The three variants of the t-statistic used proved that in the medium and long term, the BRO's IPOs were less profitable than the market portfolio. This underperformance is verified with the CARs, the CMARs, the BHARs and the BHMARs. However, it is more intense with the method of cumulative abnormal returns. In other words, investors who adopted an active investment strategy suffered heavier losses than those who opted for the passive pure investment or buy-hold strategy.

5.2. Recommendations

Following the above results, some suggestions should be made to researchers and investors of IPOs. Researchers should use the widest assortment of procedures possible in

profitability studies of IPOs to better understand their stock market behavior. This suggestion is justified by the diversity of results observed from one method to another (Welch and Ritter, 2002) and the advantages and disadvantages relating to each method (Kooli and Suret, 2001).

For IPO investors, it will be:

• Firstly to learn more about the functioning of the market in general and to follow its evolution in order to adopt a more rational behavior;

• Secondly, they must buy the IPOs at the offer price in order to benefit from the price appreciations following the first listing and to suffer relatively less losses by keeping them for the long term. In addition, the holding of IPOs in the medium and long term must be done according to the passive strategy of pure investment (or purchase conservation).

References

1. Afego P. *Market Efficiency in Developing African Stock Markets: A Survey and Review of Literature*. Shillong: North-Eastern Hill University-India (2011).
2. Kenny CJ, Moss TJ. Sock Markets in Africa: Emerging Lions or White Elephants? *World Dev.* (1998) 26:829–43.
3. Bayala B. *La Bourse Régionale des Valeurs Mobilières en Afrique de l'Ouest, L'introduction en bourse: pourquoi et pourquoi pas ? Les sociétés et les Investisseurs*. Amsterdam: Centre For Development Studies-University of Groningen-Netherlands (2002).
4. Pagano M, Panetta F, Zingales L. Why do Companies go Public? An Empirical Analysis. *J Financ.* (1998) 53:27–64.
5. Akerlof GA. The Market for "Lemons": Quality Uncertainty and the Market Mechanism. *Q J Econ.* (1970) 84:488–500.
6. Leland HE, Pyle DH. "Information asymmetries, financial structure and financial intermediation. *J Financ.* (1977) 32:377–87.
7. Aktas R, Karan MB, Aydogan K. *Forecasting Short Run Performance of Initial Public Offerings in the Istanbul Stock Exchange*. Kursat: Kursat Aydogan Bilkent University (2003).
8. Hanley KW. The under pricing of initial public offerings and the partial adjustment phenomenon. *J Financ Econ.* (1993) 34: 231–50.
9. Beatty RP, Ritter JR. Investment Banking Reputation and the Underpricing of IPO". *J Financ Econ.* (1986) 15:213–23.
10. Ben Slimane S. *Sous-Performance des IP0 à Long terme: une Synthèse Théorique*. Rochester, MN: Mayo Clinic (2008).
11. Fama EF, French KR. Common risk factors in the returns on stocks and bonds. *J Financ Econ.* (1993) 33:3–56.
12. Fama EF. Market Efficiency, Long-Term Return and Behavioral Finance. *J Financ Econ.* (1998) 49:283–306.
13. Ndong B. *Marchés Boursiers Emergents et Problématique de l'Efficience, Le cas de la Bourse Régionale des Valeurs Mobilières (BRVM)*. Ph.D. thesis. Paris: Soutenue à l'Université de Franche Comté-France le (2007).
14. Akaike H. Information Theory and Extension of the Maximum Likelihood Principle. *Proceedings of the Second International Symposium on Information Theory Budapest: Akademic Kiado*. New York, NY: (1973).
15. Allen F, Fulhaber GR. Signaling by under pricing in IPO market. *J Financ Econ.* (1989) 23:303–23.
16. Brav A. Inference in long-horizon event studies: A Bayesian approach with applications to initial public offerings. *J Financ.* (2000) 55:1979–2016.
17. Brav A, Geczy C, Gompers PA. *Is the Abnormal Return Following Equity Issuance Anomalous?*. Pennsylvania, PA: Wharton School-University of Pennsylvania (1998).
18. Chemmanur TJ. The pricing of initial public offers: A dynamic model with information production. *J Financ.* (1993) 48:285–304.
19. Grossman M, Hart O. Takeover Bids, the Free-Rider Problem and Theory of the Corporation. *Bell J Econ.* (1980) 11:42–64.
20. Jarque CM, Bera AK. A Test for Normality of Observations and Regression Residuals. *Int Stat Rev.* (1987) 55:163–72.
21. Jensen MC, Meckling WH. Theory of the Firm: Managerial Behavior. Agency Costs and Ownership structure. *J Financ Econ.* (1976) 3:305–60.
22. Lettre Économique et Financière, Hiver. *Réalisé par le Département des études de la Direction de la Régulation de l'Autorité des Marchés Financiers (AMF)*. Palo Alto, CA: Hiver (2008).
23. Merton R. A Simple Model of Market Equilibrium with Incomplete Information. *J Financ.* (1987) 42:483–510.
24. Miller E. Risk, Uncertainty and Divergence of Opinion. *J Financ.* (1977) 32:1151–68.
25. Miller E. *Long run underperformance of initial public offerings: an explanation*. New Orleans: University of New Orleans (2000).
26. Myers SC, Majluf NS. Corporate Financing Investment Decisions When Firms Have Information that the Investors Do Not Have. *J Financ Econ.* (1984) 13:187–221.
27. Zogning F. *Performance des Entreprises Cotées et Perspectives et Croissance Economique : Cas de la Bourse Régionale des Valeurs Mobilières d'Afrique de l'Ouest*. Québec City: Mémoire de Maîtrise présenté à l'Université du Québec à Montréal (2009).