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Long-term performance after share buybacks of listed French companies

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***Abstract*---**Studies examining long-term performance after stock repurchases provide mixed results. I point out two substantive problems in samplings of early studies. First, we should distinguish whether or not firms actually repurchase shares following announcements of repurchase programs. Second, as some firms frequently announce repurchase programs, we should consider overlapping announcements during the performance estimation period to avoid any confounding effects. Using a sample that corrects for these problems and the calendar portfolio regression method, I find strong evidence that firms that announce repurchase programs infrequently and repurchase shares actually experience significant longterm abnormal returns. These findings provide an explanation of why some previous studies failed to find significant positive long-term performance. Studies examining long-term stock market performance following the annual reports of French companies listed between 2004 and 2019. We will detail the various methods used to analyze stock market performance. We can distinguish between the event-driven approach: the cumulative abnormal returns (CAR) method, buy-and-hold returns (BHAR) and calendar time models, namely: the three-factor model by Fama and French (1993), the four-factor model by Carhart (1997) and the five-factor model by Fama and French (2015). We then present the results of various empirical studies that have examined the long-term performance of companies involved in AR.

***Keywords*---**Long-term performance, stock repurchases, CAR, BHAR, Fama and French.

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Introduction

Share buybacks have become the preferred method for companies to distribute cash to shareholders. The prevalence of share repurchases provides companies with an incentive to take actions that reduce the price they must pay to buy back their shares. Specifically, it can be used to achieve financial objectives such as signalling information to the market and adjusting capital structure (Andriosopoulos & Hoque :2013; Dittmar :2000; Grullon & Michaely: 2004; Ikenberry et al. :1995; Oded : 2005; Vermaelen :1981).

Share repurchase is a financial strategy whereby the company buys its own outstanding shares from the open market or directly from shareholders. However, the impact of share repurchases on long-term stock performance remains a subject of considerable debate in finance. Survey evidence from (Michaely et al :2021) suggests that the use of share buybacks by firms has increased significantly, and they find important differences between dividends and buybacks. In support of Michaely et al.'s recommendation, findings from the prior literature suggest that using dividend increases to signal a long-term contribution allows firms to be more flexible in announcing share repurchases to respond to short-term events and temporary market conditions. In addition,(Bonaimé and Kahle :2023) show that firms have spent more cash on buybacks than on dividends over the past two decades. Not only are companies spending more cash on buybacks, but the number and proportion of buyback companies has also increased significantly.

By analysing the long-term operating and stock market performance of firms that have carried out buybacks, previous studies have shown whether these firms choose the optimal time to announce buybacks and how their operating and stock market performance grows over time. (Jakob and Valta :2023) find that the market learns about the cost of capital when firms announce buybacks, consistent with the idea that buyback announcements convey information about a temporary overestimation of firms' systematic risk.

Instead, considerable evidence on the long-term effects of buybacks, few studies examine their implications in the French context, particularly in different economic contexts and under different regulatory constraints. This study focuses on examining the long-term financial impact of share repurchases on firm performance in the context of French markets, treating whether buybacks consistently increase shareholder value over extended periods.Using a portfolio return calculated over a calendar period after share repurchase, this study applies a regression analysis to evaluate long-term stock performance.

We present the results of several empirical studies on the long-term operational performance (section 2.1) and stock market performance (section 2.2) of companies that have carried out share buybacks.

1. Related literature and hypotheses

Share buyback is a financial strategy whereby a company buys its own outstanding shares on the open market or directly from shareholders. Many studies support the positive long-term stock price appreciation for three to four

years after the announcement of open market buyback programmes. However, the outperformance is mainly driven by small companies and high book-to-market ratios.

These studies interpret their findings of positive long-term performance as a consequence of market underreaction or delayed reactions to the positive signal sent by the buyback announcement. As the undervaluation signal is not fully revealed around the announcement date, share prices are affected in the period following the announcement. As a result, it is possible to earn abnormal returns by shorting the shares of buyout firms after the announcement, which does not test the implied market efficiency hypothesis.

Indeed, the results are mixed, with not all studies reporting similar evidence of abnormal stock market performance following share buybacks. For example, (Fama :1998) argues that long-term performance anomalies are methodologically sensitive and tend to diminish or disappear when the "calendar time portfolio" approach is used.(Anolick et al. :2021) find that abnormal returns following buyback announcements increase with increasing uncertainty, as both information asymmetry and undervaluation tend to increase.

Despite previous studies finding that repurchase announcements have positive announcement returns (Evgeniou et al : 2018; Lei and Zhang :2016; Manconi et al : 2019), (Chen and Liu : 2023) find that the long-term operating and stock performance of repurchasing firms is more positive than that of other firms.

Consistent with expectations, they find that current period share repurchases are negatively related to both the probability and the magnitude of post-repurchase share issuance. They also find that firms that manage share repurchases exhibit better performance in the post-repurchase period, with the progress being more pronounced for firms that repurchase.

In addition, managers find that the announcement of share repurchase programmes falsely signals undervaluation and excess cash flow to improve stock price performance (Chan et al :2010; Pham et al : 2020, Skjeltorp :2004, Zhang :2005 and McNally et al :2006) also examine long-term stock market performance after buyouts in Norway, Hong Kong and Canada respectively. They all find a positive impact on daily buyout prices and support the hypothesis that the market can detect undervaluation. (Zhang :2005) examines stock market performance fluctuations in the Hong Kong context and finds positive performance attributed to the high book-to-market ratio and small firm size.

(Brockman and Chung :2001, Zhang :2002, Cook et al : 2004 and McNally et al :2007) also provide evidence of managers' timing ability. When managers effectively use their timing ability to buy shares, actual buybacks become credible signals of undervaluation, leading to a positive price effect. However, this signal is only valuable if investors can identify companies that buy back shares.

Moreover, the long-term returns of share buybacks can be explained by takeover activity and may not create value for shareholders (Bargeronetal : 2017; Linet al : 2014). Share buybacks do not prove that they create shareholder value, they

simply mean that the stock was undervalued to begin with, and buyback completion rates are negatively correlated with long-term stock returns (Manconi et al : 2019).

Analysing the long-term stock market performance of buybacks in certain countries is complicated by the fact that these operations are carried out over a relatively long period of time. In the United States, for example, buybacks often continue for three years or more after they begin, making it technically impossible to isolate the post-announcement period (Stephens and Weisbach : 1998). This is particularly true in the US, where companies typically take three years or more to complete announced buybacks and where determining the actual number of shares repurchased can be difficult (Cook, Krigman and Leach :2003; Stephens and Weisbach :1998).

(Lakonishok and Vermaelen :1990), in their research on share buyback announcements and long-term price fluctuations, found that the firms involved experienced significant positive abnormal returns. They attributed this positive return primarily to the small size of the firms in their sample, whose share prices had visibly declined prior to the buyback. In contrast, larger firms had positive abnormal returns before the buyback but zero abnormal returns after the buyback. As a result, the existing literature on long-term performance after buybacks is inconsistent. For example, (Ikenberry, Lakonishok and Vermaelen :1995) and (Chan, Ikenberry and Lee :2004) find positive long-term performance results in the US.

Several subsequent studies conclude that if managers can identify the undervaluation of their firm's shares and decide to buy back shares, the announcement of the buyback programme signals valuable information to the less informed market. They interpret their findings as a delayed market reaction, believing that undervaluation is the main motivation for share repurchases. (Chan and al :2004; Ikenberry and al :1995 ; Brav and al. :2005)

In addition, several studies focus on the Canadian context, such as (Ikenberry, Lakonishok and Vermaelen :2000), who extend their earlier study of long-term performance after share buybacks. This is consistent with a widely accepted theory explaining positive long-term stock performance results and market underreaction, which is supported by many previous studies.

Hypothesis

(Lasfer :2002) and (Rau and Vermaelen :2002), who studied the behaviour of stock prices around US share buyback announcements, confirmed once again that one of the most common hypotheses used to explain the positive effect of open market buyback announcements is the signalling hypothesis. The signalling hypothesis assumes that there is asymmetric information between managers and investors. If managers can see that the company's shares are undervalued and act in the long-term interests of investors, they must buy back shares when they perceive that the share price is below it's true value. Open market buyback announcements therefore reflect a positive signal about the value of the company. However, as the approval of an open-market buyback programme is not a firm

commitment, the signaling hypothesis may not adequately explain its positive effect unless managers care about their reputation (Jonas Råsbrant :2013).

The undervaluation and signalling hypotheses are thus the main targets of share buyback programmes. In a context of asymmetric information, managers, who are assumed to know the value of the firm better than investors, believe that their firm is undervalued and announce a buyback programme after an unfavourable share price performance. This is a sign of the quality of management's performance and a positive expectation of future earnings. If we consider the semi-strong form of market efficiency, a buyback announcement should be immediately accompanied by a positive share price reaction.

Besides the signalling hypothesis, the free cash flow hypothesis is often used to explain the positive price reaction associated with buyback announcements (Perfect et al : 1995; Schatt and Poincelot : 2000). Buyback announcements may be positively received by investors because such operations allow firms with high cash flow and no investment opportunities to reduce agency costs between management and shareholders.

Based on the results of several previous studies around the world, we can observe a positive market reaction to the share buyback programme. The hypothesis to be tested is as follows:
Hypothesis: French companies involved in share buyback programmes outperform the stock market in the long run.

To test this hypothesis, we apply the methodology of long-term event studies to a sample of 1002 buyback programmes announced between January 2004 and December 2019. We calculate the average and cumulative abnormal returns associated with buyback programme announcements. These returns are expected to be strictly positive. The validation of our hypothesis implies that the abnormal returns of the sample observations over a horizon of 12, 24, 36 and 60 months after the announcement (BHAR12, BHAR24, BHAR36, BHAR60, CAR12, CAR24, CAR36 and CAR60) should be positive.

3. Data and Method

Our examination of long-term performance is based on portfolio returns calculated over a calendar period. Several recent studies provide evidence using this approach, including (Ikenberry, Lakonishok and Vermaelen :1995), (Loughran and Ritter :1995), (Womack et al. :1995) and (Mitchell and Stafford :1997). To apply this method, we calculate calendar-time returns for a buyback portfolio by adding companies to the portfolio at the beginning of the month following their buyback announcement and retaining them for the next five years. In effect, the portfolio is rebalanced at the beginning of each month to give each stock equal weighting. Over time, new companies are added to the portfolio and old companies are removed, causing the number of stocks in the portfolio to vary. However, the portfolio assumes that buyback companies are held for five years from the month following the announcement. In addition to this strategy, we calculate portfolio returns for other investment horizons, including the first, second, third and fifth years after the announcement. Using the calendar-time

portfolio approach, we estimate abnormal performance using two benchmarks. We evaluate performance using two models:

The event-driven approach

The cumulative abnormal returns method

Based on this approach, abnormal returns relative to the benchmark are calculated each month and then aggregated over time. This procedure assumes monthly rebalancing, with sample companies receiving equal portfolio weights each month.

To estimate the performance of share buyback announcements, we propose the event-time cumulative abnormal returns (CAR) approach. This method compares the performance of a portfolio of companies that have announced share buybacks with that of an index or benchmark portfolio. The average abnormal return for each company is measured using the cumulative abnormal return (CAR) over 12-, 24- and 36-month horizons following the share buyback announcement date. This allows us to calculate the monthly abnormal return of the portfolio companies.

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To estimate the performance of share buyback announcements, we propose the event-time cumulative abnormal returns (CAR) approach. In the event-time approach, time is defined relative to an event that occurs at a given time. This method compares the performance of a portfolio of stocks that have announced share buybacks with that of an index or benchmark portfolio. The average abnormal return for each company is measured using the cumulative abnormal return (CAR) over 12, 24 and 36 months following the share buyback announcement date. This allows the monthly abnormal return of the portfolio companies to be calculated.

The monthly abnormal return RA_{it} it for a given company i in month t is the difference between its monthly return R_{it} and that of a reference portfolio $R_{pc,it}$. This equation can be formalised as follows:

$$RA_{it} = R_{it} - R_{pc,it} \; ; \; i = 1 \text{ à } n \qquad (2.1)$$

n : is the number of companies in the sample that announce share buyback programmes.
t: represents the month before or after the announcement of the buyback programme.
We then calculate the average monthly abnormal return for company i in month t as follows:

$$RA_t = \sum_{t=1}^{n} (\frac{1}{n_t}) \, RA_{it}$$

The cumulative average abnormal return of a company i for the period following the event CAR_t is formalised as follows:

$$CAR_t = \sum_{t=1}^{T} RA_t = \sum_{t=1}^{T} \sum_{i=1}^{n} (\frac{1}{n_t}) RA_{it}$$

The estimation of the average abnormal performance of a sample of companies is based on two hypotheses:
H_0: CAR_t=0
H_1: CAR_t≠0.

3.1.2 The "buy and hold returns" model

The results of this approach, using the cumulative abnormal return (CAR), should be considered descriptive in nature as they do not represent a realistic investment strategy. Our second approach, however, represents a more realistic strategy. We assume an equal-weighted buy-and-hold investment in all buyback companies from the month following the announcement and hold them for 12 months. After one year, the portfolio is rebalanced to reduce the likelihood of a small sample of companies dominating the return calculation. The total return for this investment strategy is calculated by averaging the long-term annual returns.

If companies leave the sample early, we assume the investment is sold at the last available price and the proceeds reinvested in the benchmark portfolio for the remainder of the year. At the end of the year, the portfolio is rebalanced using only the surviving companies. The companies used to calculate the benchmark returns are treated in the same way.

To calculate the abnormal return, we formulate four benchmarks. These are similar in concept to the four benchmarks created for the CAR approach, but are calculated in line with the buy-and-hold investment strategy. To calculate the two-year abnormal return, we take the difference between the two years' returns, assuming rebalancing after the first year. Abnormal returns in the third and fourth years are treated similarly.

The buy-and-hold abnormal return (BHAR) has become the standard measure of long-term abnormal profitability (Barber and Lyon :1997; Lyon, Barber, and Tsai :1999). The BHAR measures the average profitability over several years of an investment strategy that involves buying the securities of companies involved in an event and selling them at the end of the holding period, compared to a similar strategy using companies that are not involved in the event. We calculate the BHAR's for each company in our sample over the selected time horizons, using the profitability of the control companies as a benchmark, as follows:

$$BHAR_i = \prod_{t=1}^{\tau} (1 + R_{i,t}) - \prod_{t=1}^{\tau} (1 + R_{c,t})$$

Where $R_{i,t}$ and $R_{c,t}$ are the profitability of the buyback company and the control company respectively at time t, τ corresponds to the study horizon: 6, 12, 24 ,36 and 60 months.

3.2 The calendar-time approach

3.2.1 Fama and French's three-factor model (1993)

This is a three-factor model represented by:

$$R_{p,t} - R_{f_t} = \alpha_p + \beta_p\left(R_{m_t} - R_{f_t}\right) + s_p SMB_t + h_p HML_t + e_{p,t} \qquad (2.7)$$

The Fama and French (1993) three-factor model represents the excess return $(R_{p,t} - R_{f,t})$, as a function of three risk factors common to all securities namely The market factor $(R_{m,t} - R_{f,t})$/ The size factor (SMB_t)/ The factor related to the "book-to-market ratio" or (HML_t)

The dependent variable in this regression corresponds to the excess return of a monthly portfolio of securities over the risk-free rate$(R_{p,t} - R_{f,t})$. The explanatory variables (SMB_t) and (HML_t) are zero-investment portfolios, constructed to replicate the risk factors common to all securities ; $s_p$and h_p represent the sensitivity coefficients estimated by time series regression over the sample period.
According to (Fama and French :1993), the calculation of the book-to-market value ratio and the two size factors is based on two samples of companies: one sample is based on two groups of companies according to their size: those with a small market capitalisation (S: Small), and those with large market capitalisation (B: Large). In addition to another sample based on three groups of companies according to their “book value / market value of assets” ratio. Companies with a low book-to-market ratio (L: Low) make up 30% of the sample, companies with a neutral book-to-market ratio (N: Neutral) make up 40%, and companies with a high book-to-market ratio (H: High) make up the remaining 30%.

In addition, and following the compilation of these two samples, six portfolios with balanced market capitalisation portfolios were formulated: ''S/N''' S/L'''S/H'''B/H '' , ''B/L'and '' B/N''.The SMB (Small minus Large) size factor represents the difference between the average monthly returns of the three small portfolios (S/L, S/N and S/H) and the average monthly returns of the three large portfolios (B/L, B/N and B/H).

However, the SMB factor defines the difference between the monthly returns of smaller stocks and the monthly returns of larger stocks. These two extreme size groups result in a balanced average “book value/market value of assets” ratio.
$SMB = \frac{1}{3}\left(\frac{\mathrm{S}}{\mathrm{L}} + \frac{\mathrm{S}}{\mathrm{N}} + \frac{\mathrm{S}}{\mathrm{H}}\right) - \frac{1}{3}\left(\frac{\mathrm{B}}{\mathrm{L}} + \frac{\mathrm{B}}{\mathrm{N}} + \frac{\mathrm{B}}{\mathrm{H}}\right)$
The 'factor' related to the “book-to-market value of assets” ratio HML, defines the difference between the average monthly returns of the two company portfolios with the highest “book-to-market value of assets ratios (H/S and H/B) and the average monthly returns of the two company portfolios with the lowest “book-to-market value of assets” ratios (L/S and L/B).

However, HML corresponds to the difference between the monthly return of a portfolio of stocks with high "book-to-market value of assets" ratios and the monthly return of a portfolio of stocks with low "book-to-market value of assets" ratios.
These two groups, characterised by extreme book-to-market ratios, are relatively similar in average size.

$$\text{HML} = \frac{1}{2}\left(\frac{\text{H}}{\text{S}} + \frac{\text{H}}{\text{B}}\right) - \frac{1}{2}\left(\frac{\text{L}}{\text{S}} + \frac{\text{L}}{\text{B}}\right) \qquad (2.9)$$

4.2.2 Carhart's four-factor model (1997)
This is a four-factor model by Carhart (1997) represented by :

$$R_{p,t} - R_{f_t} = \alpha_p + \beta_p\left(R_{m_t} - R_{f_t}\right) + s_p SMB_t + h_p HML_t + \gamma_p Mom_t + e_{p,t} \qquad (2.10)$$

Carhart's (1997) four-factor model defines the excess of an equity portfolio as $(R_{p,f} - R_{f,t})$ and is a function of Fama and French's (1993) three risk factors and a factor docked to the momentum effect Mom_t.
Subsequently, this fourth variable corresponds to a zero-investment portfolio designed to replicate the risk factor docked to the momentum effect and with a sensitivity coefficient $\gamma_p$that is considered by a time regression on the calendar period.

(Carhart :1997) used three portfolios to measure the explanatory variable of momentum. The first portfolio consists of the firms with the highest monthly performance over the last l2 months, corresponding to 30% of the sample. In addition, there is a second portfolio made up of 40% of the firms in the sample with a neutral historical monthly performance, and a third portfolio with the remaining 30% of the firms in the sample.

For a given month t, this variable represents the difference between the average monthly return of the portfolio of securities with the best performance and the monthly return of the portfolio of securities with the worst performance.

Fama and French's five-factor model (2015)

First, the CAPM model was applied, followed by Fama and French's three-factor model, which was introduced to address the limitations of relying solely on the beta coefficient to explain the observed differences in returns between value and growth stocks and between small and large stocks. In addition,(Fama and French :1993), in response to Ross's APT model, identified anomalies in the explanation of the average return on financial assets. In the early 1990s, Fama and French demonstrated more powerful explanatory factors for stock or bond returns. (Fama and French :1992) developed a model based on empirically calculated style factors to explain the equity risk premium. These variables were derived from microeconomic factors from company balance sheets, such as equity, market value and book-to-equity ratio. However, only five variables were proposed as potential explanatory factors for returns: beta, book-to-market ratio (BV/MV), market capitalisation (MC), leverage and P/E ratio.

As a result, (Fama and French :2015) extended the three-factor model by introducing two additional factors: one related to investment (CMA) and one related to profitability (RMW). Among the set of variables, some play an important role in explaining performance and contribute to the robustness of the model, while others simply add redundancy. Consequently, in (Fama and French's :2015) five-factor model, the introduction of the investment and profitability factors tends to create redundancy, as it weakens the HML factor, although the model provides a higher R^2 than previous versions.(Fama and French :1993, 2012, 2015) found that the greatest challenge is modelling the valuation of small-cap stocks in terms of market capitalisation. Within this framework, and in line with the variable selection process, (Fama and French :1992) and (Banz :1981) selected 'market capitalisation' as the size variable. According to (Fama and French :1992), the P/E ratio is an integral part of company valuation as it helps to determine whether a stock is over- or undervalued. If the ratio is greater than one, the book value of the company exceeds its market value, implying that the stock is undervalued by the market. Otherwise, it is overvalued. In addition, book value often differs from market value because the latter takes into account the company's potential future growth. Each of these variables can individually assess the price of an asset and extract information about risk and return (Keim :1983; Fama and French :1992).

In constructing our data, we built mimicking portfolio factors based on the size variable (market capitalisation) and the BE/ME ratio, following (Fama and French :1993). Our methodology was as follows: in June of each year, the CAC ALL shares of French listed companies from the database were ranked by market capitalisation. The median size of the CAC ALL was used to separate the stocks into two categories: "S" (small), representing the smallest market capitalisations, and "B" (big), representing the largest. As the average size of French listed companies is smaller, this classification avoids a disproportionate number of stocks in the small-cap category.

The same stocks were also divided into three categories based on their BE/ME ratio: L (Low - the bottom 30% with the lowest ratios), M (Medium - the middle 40%) and H (High - the top 30%). As a result, six portfolios were created by combining size and style characteristics (SL, SM, SH, BL, BM, BH). For example, SL contains small-cap stocks with low book-to-market ratios. The two mimicking portfolios created from these stocks are "SMB" and "HML". Specifically, "SMB" represents the difference between the average returns of the three smallest market capitalisation portfolios (Small Value, Small Neutral and Small Growth) and the three largest market capitalisation portfolios. "HML is similarly constructed as the difference between the average returns of the two portfolios (small and large caps) with high book-to-market ratios and those with low ratios. In addition to HML and SMB, the third variable in the three-factor model is the market portfolio return premium (Rm - Rf).

According to (Chen, Novy-Marx and Zhang :2010), the three-factor model remains incomplete in explaining performance. They argue that adding profitability and investment variables improves the R^2 of the model, reducing the shortcomings of the model specification and making it more appropriate. As a result, (Fama and

French :2015) add these two factors (profitability and investment) to their original model.

$$R_{p,t} - R_{f_t} = \alpha_p + \beta_p\left(R_{m_t} - R_{f_t}\right) + s_p SMB_t + h_p HML_t + r_p RMW_t + c_p CMA_t + e_{p,t} \quad (2.11)$$

$R_{p,t} - R_{f_t}$: Market risk premium ; $s_p SMB_t$: Difference between the expected return of a small-cap portfolio and that of a large-cap portfolio ; $h_p HML_t$: Difference between the expected return of a portfolio of securities with a high ratio and a portfolio with a low ratio ; $r_p RMW_t$: Profitability factor ; $c_p CMA_t$: Investment factor

Description of the sample

Our study covers an initial sample of all share buyback programmes announced by French companies between January 2004 and December 2019. During this period, share buyback practices in France have evolved in response to economic conditions and regulatory recommendations. We manually collected the characteristics of 1002 programmes from the AMF website, using transaction documents published monthly by the AMF. The AMF, an independent administrative authority, summarises the various authorised share buyback programmes announced by French listed companies. It provides information on the maximum amount payable for the programme, the maximum purchase price and the minimum sale price, the expiry date, the number of repurchase announcements for each company in the previous month and the total number of shares repurchased.

From our initial sample, we excluded companies for which stock market data was not available in the database. As a result, 697 transactions were eliminated due to unavailability of data. We also excluded companies with a large number of missing data points, making it difficult to examine their share price performance 60 months after the buyback announcement. Typically, buyback programmes are carried out in the 18 months following the shareholders' meeting that authorises the programme. In addition, a second programme often replaces and cancels the first. Therefore, the period for the implementation of the first programme starts on the date of the AGM that approves it and ends on the date of the next AGM that approves the second programme.Finally, only companies that could be properly matched with complete data make up the final sample. The selected sample consists of 305 announcements for the period 2004-2019. Table 1 shows the number of share buyback announcements made by French companies during this period.

Table 1: Statistics of the announcement of share buybacks by French companies for the period 2004-2019

	Sample initial	Sample Final
Number of companies	481	130
Number of transactions	1002	305

Table 2 shows the 10 companies in our sample that reported the highest volume of regular share repurchases in terms of the maximum amounts paid by the programme company during the study period, the corresponding dates of their buyback programmes and the business sectors to which they belong.

Table 2: Sectoral breakdown of share buyback programmes

sic1				
sic1	**Frequency**	**%**	**Frequency cumulative**	**Percent. cumulative**
Chemistry	8	2.63	8	2.63
Computer science	46	15.13	54	17.76
Durable products	77	25.33	131	43.09
Food products	26	8.55	157	51.64
Construction materials	21	6.91	178	58.55
Pharmaceutical products	7	2.30	185	60.86
Retail	29	9.54	214	70.39
Services	44	14.47	258	84.87
Textiles/Printing	35	11.51	293	96.38
Transport	11	3.62	304	100.00

Note: Table 2 shows the distribution of programmes in the sample by industry, using the SIC code (the two-digit Standard Industrial Classification). If the company is active in more than one sector, the main SIC code provided by the Worldscope database is used. The enterprises in our sample operate in 10 economic activities and are more concentrated in the consumer durables and IT sectors.

The Different Methods

The aim of this study is to estimate the long-term performance of share buy-back programmes implemented by French companies over time horizons of (0; 12), (0; 24), (0; 36) and (0; 60) months using the event-time approach and over 12, 24, 36 and 60 months from the announcement date using the calendar-time approach.

7.1 Results of Long-Term Performance Analysis

We analyse the long-term performance of French companies that have announced share buyback programmes. Performance is calculated using two approaches: the event time approach over (0; 12), (0; 24), (0; 36) and (0; 60) months, and the calendar time approach over 12, 24, 36 and 60 months following the announcement date of the share buyback programmes. Performance is evaluated using the Cumulative Abnormal Returns (CAR) method and the Buy and Hold Abnormal Returns (BHAR) method (event-based approach) as well as the Fama and French three-factor model (1993), the Carhart four-factor model (1997) and the Fama and French five-factor model (calendar-based approach).

Cumulative abnormal returns (CAR) and Buy-and-Hold Abnormal Returns (BHAR)

Table 3: Descriptive statistics

	CAR (%)				BHAR (%)			
	12 month	24 month	36 month	60 month	12 month	24 month	36 month	60 month
Averge	-0,41	16,63[a]	7,81	15,28[a]	3,61	17,90[a]	15,46[a]	25,73[a]
t-stat	-0,13	3,34	1,53	2,56	1,05	4,06	3,03	4,41
Median	6,39	10,08[a]	-5,10	6,15[b]	7,25	14,31[a]	6,20[b]	18,56[a]
Z_w	-0,02	3,18	0,36	2,16	0,75	3,65	2,02	3,42

a : significant at level 1 % **b** : significant at level 5 % **c** : significant at level10 %

Note: Abnormal returns are calculated by taking into account the returns of the benchmark companies. Two calculation methods are used: Cumulative Abnormal Returns (CAR) and Buy and Hold Abnormal Returns (BHAR). The average cumulative abnormal return is calculated as follows: $CAR_\tau = \sum_{t=1}^{\tau} \sum_{i=1}^{n_t} w_i \left[R_{fe,it} - R_{fc,it}\right]$. The average abnormal buy-and-hold profitability is calculated as follows: Where τ represents the considered (6, 12, 24 and 36 months), R_{it} is the profitability of company i which is involved in the buy-back operation during month t, $R_{fc,it}$is the profitability of the corresponding control company in month t. To test the statistical significance of the average BHAR, we used the skewness-adjusted Student's t-test, as recommended by Barber, Lyon, and Tsai (1999).

Table 3 shows the cumulative abnormal returns (CAR) and the buy-and-hold abnormal profitability (BHAR) for the first, second, third and fifth years after the announcement of the share buyback programmes. Based on these results, we find that French companies that announced share buyback programmes for the (0; 12) month period have non-significant cumulative abnormal returns and buy-and-hold abnormal returns of -0.41% (t-stat = -0.13) and 3.61% (t-stat = 1.05), respectively.

For the (0; 24) month period, French companies show a cumulative abnormal return of 16.63% (t-stat = 3.34) and a buy-and-hold abnormal return of 17.90% (t-stat = 4.06). These returns are positive and statistically different from zero at the 1% significance level. Over a five-year post-transactionhorizon (0; 60), the companies report a CAR of 15.28% (t-stat = 2.56) and a BHAR of 25.73% (t-stat = 4.06).

Thus, the positive abnormal performance observed in the second and fifth years after the operation suggests that the market reacts positively to the announcement of share buyback programmes in the long run. These results contradict the market efficiency hypothesis, which assumes an immediate and complete market reaction to such announcements. For the (0; 36) month period, CARs are positive at 7.81% but not statistically significant (t-stat = 1.53), while BHARs for this period are 15.46% (t-stat = 3.03) and statistically significant at the 1% threshold.

Our results are consistent with those of Ikenberry, Lakonishok and Vermaelen (2000), who analysed the long-term performance of Canadian firms that announced share repurchase programmes between 1989 and 1997. Using a sample of 1,060 open market buyback announcements, they find abnormal performance of 7.27% (t-stat = 4.39) and 14.91% (t-stat = 6.50) for the (0; 12) and (0; 24) month periods, respectively, based on the event-time approach.

Consequently, the long-term performance of companies that implement share buy-back programmes varies over time. Looking at the period from 2004 to 2019 and the five years following the operation, we can conclude that there is an improvement in stock market performance, thus confirming our hypothesis.

Table 4: Returns regression of stock returns using the Fama and French (1993) three-factor model

Time horizon	***12***	***24***	***36***	***60***
α_p	$1{,}431^b$	$1{,}228^a$	$0{,}896^a$	$0{,}534^b$
	(2,26)	*(2,62)*	*(2,63)*	*(2,20)*
$R_m - R_f$	$1{,}202^a$	$1{,}220^a$	$1{,}113^a$	$1{,}110^a$
	(9,26)	*(13,27)*	*(16,94)*	*(23,21)*
SMB	$0{,}659^a$	$0{,}599^a$	$0{,}473^a$	$0{,}411^a$
	(5,07)	*(6,07)*	*(6,67)*	*(7,86)*
HML	$0{,}413^a$	$0{,}326^a$	$0{,}301^a$	$0{,}261^a$
	(3,51)	*(3,62)*	*(4,67)*	*(5,47)*
R^2 adjusted	*0,427*	*0,550*	*0,650*	*0,760*
N	*120*	*149*	*167*	*185*
F	*30,90*	*61,74*	*104,53*	*197,28*
P-value	*0,00*	*0,00*	*0,00*	*0,00*

a: significant at level 1 % **b**: significant at level 5 % **c**: significant at level10 %

Note: Table 4 shows the regression results of the Fama and French model for companies involved in share buybacks over the period 2004-2019 at 12, 24, 36 and 60 month horizons. The model tested can be formulated as follows:

$$R_{p,t} - R_{f_t} = \alpha_p + \beta_p\left(R_{m_t} - R_{f_t}\right) + s_p SMB_t + h_p HML_t + e_{p,t}$$

Or $(R_{p,t} - R_{f,t})$corresponds to the monthly return of the portfolio of companies that buy back their own shares; SMB_t is the factor related to size; (HML_t is the factor related to the ratio "book value/market value of assets" ratio; $s_p$and $h_p$are the sensitivity coefficients considered by a time regression on the calendar period. The t-statistics are shown given in brackets.

The results in Table 4 show that companies that repurchased shares in the period 2004-2019 had significantly positive abnormal returns over all the horizons considered. The average monthly abnormal returns calculated according to the Fama and French (1993) model presented in Table 4 are positive and statistically different from zero.

Over a 12-month horizon, the average abnormal profitability is statistically significant at the 5% threshold, corresponding to a percentage of 1.43 per month with a Student's t of 2.26, which implies an average profitability of 18.57% over this horizon. Consequently, over a 24-month horizon, the average abnormal profitability is 1.228% per month, with a Student's t of 2.62. It is significantly different from 0 at the 1% threshold and represents a compound profitability of (15.11). Let's add that, over a 36-month horizon, the average abnormal profitability is positive and statistically significant at the 1% threshold of 0.896% per month, with a Student's t of 2.63, giving a compound profitability of (37.86%) over a 36-month horizon. On the other hand, over a 60-month horizon, the average abnormal profitability is also positive and statistically significant, but at a 5% threshold, which corresponds to a value of (0.534%) per month, with a Student's t of 2.20, which corresponds to a compound profitability of (37.65%) over a 60-month horizon.

Based on these results, we can say that the market reacts positively at 12, 24, 36 and 60 months after the announcement of share buybacks by French companies. Furthermore, we note that the risk coefficient of the size factor relative to the Fama and French (1993) three-factor model is positive at 0.659 (t-stat = 5.07) for the 12-month period, which is statistically different from zero at the 1% threshold.

And for the 24, 36 and 60 month horizons, this coefficient is 0.599 (t-stat = 6.07), 0.473 (t-stat = 6.67) and 0.411 (t-stat = 7.86) respectively, statistically significant at the 1% threshold. This shows that companies that announce regular share buyback programmes are, on average, small.

Furthermore, the risk coefficient of the ratio "book value/market value of assets" is 0.413 (t-stat = (3.51)) which is statistically significant at the 1% level for the 12-month period, while for the 24-, 36- and 60-month periods this coefficient is 0.326 (t-stat = 3.62); 0.301 (t-stat = 4.67); 0.261 (t-stat = 5.47) which is statistically significant at the 1% level (t-stat = 2.03), respectively. These results suggest that companies that announce share buyback programmes are small and valuable.

The results in Table 4 show that the coefficient of determination of the Fama and French (1993) model for the first 12 months reached 42.7% (adjusted R2). And for the 24 and 36 month horizons, the coefficient of determination reaches 55.01%, 65.03% and 76.09% respectively. Thus, these results are consistent with those of (Ikenberry et al :1995) and (Chan, Ikenberry, and Lee :2007); (Peyer and Vermaelen :2009); (Albaity and Said :2016) as well as (Yook :2010), while they are inconsistent with those of (Mitchell and Stafford :2000) and (Su and Lin :2012).

Carhart's (1997) four-factor model

We estimate abnormal returns over time horizons of 12, 24 and 36 months following the announcement date of share buyback programmes for the sample of French companies over the study period from January 2004 to December 2019. To check the robustness of the results of Fama and French's (1993) three-factor

model, we interpret the post-announcement performance of share buyback programmes calculated by Carhart's (1997) four-factor model.

Table 5 shows that the abnormal returns calculated according to the Carhart model are positive and statistically different from zero at the 1% threshold, with (α = 1.284%; t-stat =2.93) for the 12-month period, corresponding to a compound return of 16.54. Over a 24-month horizon, the average abnormal profitability is 0.791% per month, with a Student's t of 2.82. It is also significantly different from 0 at the 1% threshold, corresponding to a compound return of 20.81%. Furthermore, for the 36-month period, the abnormal returns are statistically different from zero but insignificant at 0.386 (t-stat =1.42), resulting in a compound return of 14.87%. Finally, over a 60-month horizon, the average abnormal return is positive, statistically different from zero and significant at the 1% threshold of 0.529% per month with a t of Student's 2.69, giving a compound return of 37.24% over a 60-month horizon. We therefore confirm the results already observed with the Fama and French (1993) model. It should be noted, however, that the annual returns observed with the Carhart (1997) model are lower than those calculated with the Fama and French (1993) model.

We also find that the adjusted R2 is 52.2%, 67.6%, 69.32% and 81.6% for the 12, 24, 36 and 60 month periods respectively. In addition, the coefficient of the momentum factor is -10.4% (t-stat= -1.60) and -5.4% (t-stat= -1.28), statistically insignificant for the 12 and 24 month horizons respectively, while it is -10.9% (t-stat= -2.58), statistically significant at the 1% level for the 36 month horizon, and -6.6% (t-stat= -2.18), statistically significant at the 5% level for the 60 month post-operation period.

Table 5 also shows that the risk coefficient for the size factor relative to Carhart's (1997) four-factor model is 0.533 (t-stat = 5.81) for the 12-month period, which is statistically significant at the 1% level. For the 24-, 36- and 60-month horizons, this coefficient is 0.396 (t-stat = 6.61), 0.400 (t-stat = 6.71) and 0.392 (t-stat = 9.13) positive and statistically significant at the 1% level.

The risk coefficient for the factor "book value/market value of assets" is (0.23) (t-stat =2.88) for the 12-month period, statistically significant at the 1% level. For the time horizons of 24, 36 and 60 months, this coefficient is (0.196) with a t Student's of 3.64 for the two years following the operation. Furthermore, it is (0.188) with a t Student's of 3.51 and 0.190 with a t Student's of 4.92 for the third and fifth years after the share repurchases, respectively, so that these coefficients are statistically significant at the 1% threshold. This confirms the results obtained with the Fama and French (1993) three-factor model, which shows that companies announcing share buyback programmes are small and valuable.

Table 5: Regression of stock returns by Carhart's four-factor model (1997)

Carhart's four-factor model (1997)				
Time horizon	***12***	**24**	***36***	**60**
α_p	$1{,}284^a$	$0{,}791^a$	$0{,}386$	$0{,}529^a$
	(2,93)	*(2,82)*	*(1,42)*	*(2,69)*
$R_m - R_f$	$1{,}006^a$	$0{,}961^a$	$0{,}989^a$	$1{,}027^a$
	(10,86)	*(16,25)*	*(16,83)*	*(24,28)*
SMB	$0{,}533^a$	$0{,}396^a$	$0{,}400^a$	$0{,}392^a$
	(5,81)	*(6,61)*	*(6,71)*	*(9,13)*
HML	$0{,}238^a$	$0{,}196^a$	$0{,}188^a$	$0{,}190^a$
	(2,88)	*(3,64)*	*(3,51)*	*(4,92)*
MOM_t	*-0,104*	*-0,054*	$-0{,}109^a$	$-0{,}066^b$
	(-1,60)	*(-1,28)*	*(-2,58)*	*(-2,18)*
R^2 *adjusted*	*0,522*	*0,676*	*0,693*	*0,816*
N	*161*	*174*	*185*	*185*
F	*44,98*	*92,14*	*105,51*	*207,12*
P-value	*0,00*	*0,00*	*0,00*	*0,00*

^{a}, ^{b}, ^{c}: significant at the 1%, 5%, and 10% levels, respectively.

Note: Table 5 shows the results of the regressions of the Carhart model for companies involved in share buybacks during the period 2004-2019 at 12, 24, 36 and 60 month horizons. The tested model can be formulated as follows: $R_{p,t} - R_{f_t} = \alpha_p + \beta_p\left(R_{m_t} - R_{f_t}\right) + s_p SMB_t + h_p HML_t + \gamma_p Mom_t + e_{p,t}$
Or $(R_{p,t} - R_{f,t})$, corresponds to the monthly excess return on the portfolio of companies buying back their own shares. (SMB_t) is the factor related to size ; (HML_t) is the factor related to the ratio "book value/market value of assets"; s_p, $h_p and\ \gamma_p$are the sensitivity coefficients considered by a time regression on the calendar period; t a factor docked to the momentum effect Mom_t. The t-statistics are given in parentheses. Returns are expressed as percentages.

Fama French's five-factor model (2015)

From these results, we can also confirm the results already found according to the three-factor model of Fama and French (1993), as well as the four-factor model of Carhart (1997), and say that the market reacts positively over a 36- and 60-month horizon after the announcement of share buyback programmes by French companies. Furthermore, we find that the risk coefficient of the size factor relative to Fama and French's (2015) five-factor model is positive by 0.55 with a Student's t of 4.87 and 0.488 with a Student's t of 5.31 for the 36 and 60 month periods, respectively. These results are also statistically significant at the

1% level, confirming that companies announcing share buyback programmes are on average small.

In this context, the risk coefficient of the ratio "book value / market value of assets" is 0.301, statistically significant at the 1% level (t-stat = (2.87)) for the 36-month period, while for the 60-month period this coefficient is 0.305 (t-stat = 3.61), also statistically significant at the 1% level.

Therefore, we can confirm that companies that announce share buyback programmes are small and valuable. As a result, certain variables play a specific role in explaining performance, proving that their analysis is important. In fact, the factor associated with the "RMW" investment is (-0.114) with a Student's t of -1.04, and is therefore negative and statistically insignificant at the 36-month horizon, while it is (-0.162) with a Student's t of (-1.78) at the five months following the operation, and is also statistically significant at the 10% threshold. Moreover, the coefficient associated with the "CMA" profit is 0.048 (t-Stat=0.41), positive and statistically insignificant at 36 months. On the other hand, it is -0.001 (t-Stat= -0.01) at 60 months.

Furthermore, the results obtained in Table 2.9 show that the coefficient of determination of the Fama and French (2015) “adjusted R2” model reached 59.6% at the 36-month horizons. And for the 60-month horizons, the coefficient of determination reached 64.6%.

Table 6: Regression of stock returns using the Fama and French five-factor model

Fama and French 5-factor model (2015)		
Time horizon	*36 mois*	*60 mois*
α_p	$0{,}006^a$ *(3,87)*	$0{,}007^a$ *(4,10)*
$R_m - R_f$	$1{,}181^a$ *(12,28)*	$1{,}087^a$ *(14,16)*
SMB	$0{,}550^a$ *(4,87)*	$0{,}488^a$ *(5,31)*
HML	$0{,}301^a$ *(2,87)*	$0{,}305^a$ *(3,61)*
RMW	*-0,114* *(-1,04)*	$-0{,}162^c$ *(-1,78)*
CMA	*0,048* *(0,41)*	*-0,001* *(-0,01)*
R^2 *adjusted*	*0,596*	*0,646*
N	*167*	*185*
F	*50,28*	*68,56*

P-value	*0,00*	*0,00*

a : significant at level 1 % **b** : significant at level 5 % **c** : significant at level10 %

Note: Table 6 shows the results of the Fama and French five-factor model regressions for companies involved in share buybacks over the period 2004-2019 at 12, 24, 36 and 60 month horizons. The model tested can be formulated as follows:

$$R_{p,t} - R_{f_t} = \alpha_p + \beta_p\left(R_{m_t} - R_{f_t}\right) + s_p SMB_t + h_p HML_t + r_p RMW_t + c_p CMA_t + e_{p,t}$$

Or$\left(R_{p,t} - R_{f,t}\right)$ is the market risk premium$s_p SMB_t$is the difference between the expected return of a small-cap portfolio and that of a large-cap portfolio ; $h_p HML_t$ is the difference between the expected return of a portfolio of high and low ratio securities; $r_p RMW_t$is the profitability factor and $c_p CMA_t$, the investment factor. T-statistics are given in brackets. Profits are expressed as a percentage.

Conclusion

All financial practices and decisions in a company are horizontally consistent. Share repurchase is a critical financial practice that could be used to adjust a firm's capital structure and as part of the firm's payout policy. This study mainly examines the long-term performance of French firms that repurchase their shares over the period 2004-2019.

Similar to previous studies, we show that the portfolio outperformance of buyout firms during periods of intense stock market activity is not sensitive to the methods used to measure abnormal returns. This supports the idea that buyback firms are, on average, undervalued during this period. The evidence suggests that buyback companies economically and statistically outperform comparable companies in terms of size and book-to-market ratio over the long term.

Numerous studies have examined long-term stock market performance following share buybacks, with conflicting results. On the one hand, (Ikenberry et al :1995), Ikenberry et al :2000) and (Zhang :2005) find evidence of positive long-term performance for part of their samples in the US, Canada and Hong Kong respectively. On the other hand, (Mitchell and Stafford :2000) find no evidence of anomalous long-term performance in the US. In fact, they explain that the market is more indifferent to short-term AR because it treats its operations with scepticism and reacts slowly to announcements.

This explains their positive long-term post-announcement performance. Scepticism about buyouts is explained by the fact that in many countries buyout announcements convey to the market an intention rather than a commitment to buy back shares (Ikenberry & Vermaleln, 1996; Lie, 2005; Stephens & Weisbach, 1998). In practice, there is evidence of share price increases following share buyback programmes in many countries and regions.

According to Ken (C. Yook :2011), there are several limitations in the existing literature on the long-term performance of AR. He cites the example of whether or not the deal is completed after the announcement. Let's explain that in the case of open market buybacks, management does not take into account the type and

number of shares actually repurchased, as the company may choose to buy more or fewer shares than originally authorised for the buyback, or sometimes no shares at all. In addition, a large number of firms announce buyback programmes and end up not repurchasing any of their shares (Ikenberrry & Vermaelen :1996; Stephens & Weisbach: 1998).

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