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MERGER WAVES: THE EFFECT ON POST-MERGER CORPORATE PERFORMANCE

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Abstract

The research offers a thorough analysis of the influence of historical merger waves on post-merger corporate performance. Through the application of statistical tests and regressions, I show that mergers and acquisitions initiated during merger waves are associated with higher short-term abnormal stock returns and lower long-term abnormal stock returns. In contrast to existing research, I use the Fama–French three-factor model to measure the cumulative abnormal stock performance of acquirers for two-day, two-year, and three-year periods following the acquisition.

Key Words

Merger & Acquisitions, M&A, Merger Waves, Corporate Performance, Long-Term Abnormal Returns, Short-Term Abnormal Returns, Value Creation, Off-Wave, On-Wave, Wealth Effect

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1. Introduction

Intrigued by the most recent M&A boom in the post-pandemic setting, I was motivated to look into past trends in M&A activity. Rather than constant, historical M&A activity is clustered by time and industry, creating so-called merger waves. It is interesting to note that, historically, all merger waves started during an economic boom and ended with a recession. I pondered what such a pattern would mean and its consequences on M&A value creation, raising questions regarding the motivations for initiating mergers and acquisitions during waves. Bain's research has determined that companies that engage in investing throughout the whole economic cycle have superior returns than those that participate only in favorable economic cycles. While greater capital liquidity and cheaper borrowing in economic booms could serve as a positive incentive for doing an M&A and increase post-merger gains, motivations such as peer and market pressure could significantly hinder the long-term performance of the companies involved in such mergers and acquisitions. Merger waves could drive agency-driven behavior coupled with managerial herding (Duchin, Schmidt, 2012). In addition, as market optimism prevails in economic booms, managers have fewer constraints to undertake potentially wealth-destroying mergers (Gugler, Mueller, Weichselbaumer, 2012). Therefore, I investigate if and how post-merger corporate performance depends on whether the acquisition has happened on or off the waves. I find that it does. To measure corporate performance, I look at short-term and long-term abnormal stock returns of acquirers. Unlike previous research, I use the Fama French three-factor model, rather the market model, to better control for risk factors. While similar to previous research, I find that long-term abnormal returns are lower for the acquisitions initiated during merger waves, abnormal announcement returns are found to be higher in such acquisitions.

Mergers and Acquisitions (M&A) have been part of corporate strategy and restructuring for a long time, coinciding with the existence of companies. The M&A activity in 2021 reached

a record of USD 5.6 trillion in value, surpassing the previous record from 2007, stimulated by a post-pandemic economic rebound.[1] Various exogenous factors such as globalization, technological advancements, and social and environmental considerations have shaped the M&A environment. Although well-performing companies use M&A to adjust their strategies during strong as well as uncertain periods, historically there have been several periods in which M&A activity experienced a wave-like pattern. Merger waves can be defined as cyclical periods in which an unusually high volume of M&A activity occurs, on an industry and economy-wide scale. Since billions of dollars of assets are exchanged during such waves, their economic importance is significant. In this research, I focus on the impact of merger waves on the performance of companies that initiated acquisitions during them. There is much research done on M&A value creation and its influence on corporate performance. In addition, there are various theories on what drives merger waves. However, little attention is paid to comparing post-merger performance between acquisitions initiated during waves and those initiated off the waves. This research aims to explore if and how M&A value creation differs between acquisitions that happened off and on merger waves.

2. Literature Review

2.1. M&A Waves

Six major merger waves were recognized in history. The first merger wave, known as the "great merger movement", occurred from 1893, after the Long Depression in 1883, until 1904, immediately before World War I. It was characterized by many horizontal mergers and acquisitions in a then unconcentrated environment, predominately in the manufacturing and mining sectors, conducted by small players to establish monopolies (Gaughan, P. A. , 2018). This period conceived some of today's industrial giants such as U.S. Steel, DuPont, and General

[1] Refinitiv Data

Electric. Ironically, the Sherman Antitrust Act was established in 1890 to prevent monopolization but was invoked rarely against industry monopolies.

The second wave started in the post-WWI economic boom of 1918 and ended in 1929 with the Great Depression. With higher anti-monopoly regulations, in the second wave, vertical mergers were predominant and contributed to the origination of oligopolies.

The conglomerate merger period was featured in the third wave, starting in the booming economy of 1965 and lasting until 1969. Diversification of revenues became an important part of corporate strategy to decrease operational risk (Serves, 1996).

The fourth wave occurred between 1984 and 1989, characterized by hostile mergers as well as a higher average deal size. The deregulation of certain industries such as natural gas, air transport, and broadcasting contributed to higher volume in these industries (Mitchell and Mulherin 1996). Falling interest rates increased the use of debt in transactions during the fourth wave, rising the popularity of leveraged buyouts.

Following the recession of 1990-1991, M&A flow began to increase again in 1992. The decade of the 90s brought the increased demand for economies of scale and the origination of multinational companies. Many mega deals including ExxonMobil and GlaxoSmithKline took place in the fifth wave which ended with the burst dot-com bubble in 2001.

The sixth merger wave took place from 2004 to 2007, following the short recession resulting from the burst of the dot-com bubble. In an effort to stimulate the economy, central banks have lowered interest rates which again fueled private equity deals. In addition, investors became more involved in corporation management and globalization played a big role in the creation of multinational companies. The sixth wave was intense and rapid, resulting in high valuations and ending with the 2007 subprime crisis.

Martynova and Renneboog (2008) illustrate these US merger waves graphically by representing a number of deals from 1987 to 2002:

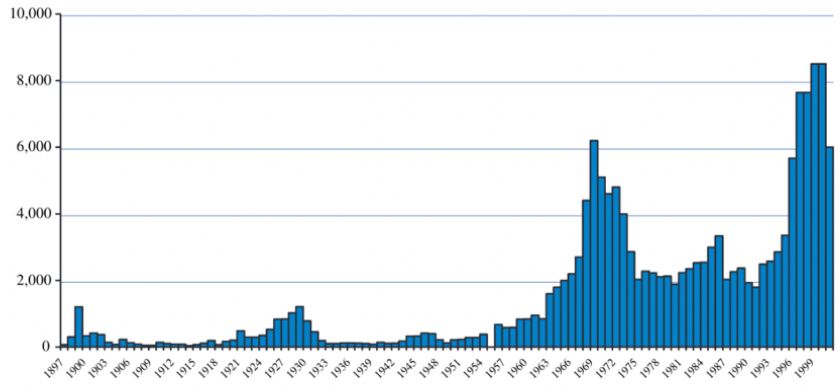

Figure 1: M&A Activity (1987-2002)

2.2. What drives M&A waves

There are a couple of theories in the literature on what triggers merger waves. The neoclassical hypothesis suggests that economic, regulatory, and technological shocks lead to industry reorganization and that induced with greater capital liquidity, merger waves serve to accommodate necessary asset reallocation (Harford 2005). The behavioral theories, in contrast, advocate that stock market overvaluations trigger increased merger activity as managers have the incentive to exchange the companies' shares for less overvalued assets (Shleifer, Vishny, 2001). Many studies show that economy-wide waves arise from waves at the industry level. Harford and Ahern (2014) argue that while initial economic industry shocks are random, industry customer-supplier links play an important role in transmitting the wave through industries, creating economy-wide waves. Although the literature has not reached a consensus on the cause of merger waves, behavioral and neoclassical theories are the most favored ones.

2.3. Value creation of M&A

The effect of M&A on the corporate performance of acquirers and targets has been widely researched. Professor Damodaran is famous for his view that M&A has a destructive effect on both values of the target and bidder. On the other hand, studies suggest that M&A creates value for the combined stakeholders of targets and acquirers, at least measured by short-term abnormal stock returns. Jensen and Ruback (1983) summarize much of the scientific literature that indicates that corporate mergers and acquisitions generate net increase in

combined shareholder value. The majority of studies support the view that shareholders of target companies are winners in mergers and acquisitions. Eckbo (1983) shows the improved stock performance of target firms around the announcement days within the horizontal mergers in manufacturing and mining industries during the 1960s to 1970s. Bradley, Desai, and Kim (1988) found that successful tender offers increase the combined value of participating firms, while the bidding process increases the returns of targets and decreases the returns of bidders. Most evidence suggests that mergers do not create significant value for participants when analyzing long-term abnormal returns. Asquith (1983) analyzed long-term abnormal returns of acquirers and found a statistically significant negative wealth effect of M&As.

To measure the post-M&A value creation, most studies look at short-term and long-term post-merger stock performance. For announcement returns, they use cumulative average abnormal returns (CAAR) with event windows ranging from 2 days to a couple of months around the announcement date. The Capital Asset Pricing Model (CAPM) is the most common model for measuring abnormal returns. For long-term stock performance estimates, studies use a CAAR with an extended window of several years after the merger, as well as calendar returns and buy-and-hold abnormal returns (BAHRs). Apart from abnormal stock returns measurement, some studies focus on post-merger operating performance to measure value creation. Healy, Palepu, and Ruback (1992) found significant increases in operating cash flows of companies that conducted M&A, relative to their industries, and a positive correlation between operating cash flow increase and abnormal announcement returns.

2.4. Value Creation on and off Merger Waves

Much empirical and theoretical research has been done on companies' post-merger performances in each wave. However, few studies compare post-merger returns across wave and non-wave periods. For example, Banerjee and Eckard (1998), Leeth and Borg (2000), and Bradley, Desai, and Kim (1988) investigated M&A deals during the first, second, and third

waves. While these studies present well measurements of the value creation of M&A during one or more waves, they do not capture the difference between transactions that happened off and on the merger waves.

Other studies contribute by comparing post-announcement returns between periods other than merger waves. Bowman, Fuller, and Nain (2009) proved that transactions initiated during the dot-com bubble had superior long-term post-merger performance than those initiated in the boom period. They also found that acquirers that initiated the transaction during high valuation periods show higher announcements but lower long-term abnormal stock returns and operating performance than those initiating the acquisition during low-valuation periods.

In one of a few studies which compare announcement returns across periods on and off-waves, Duchin and Schmidt (2012) showed that acquisitions initiated during the waves are associated with lower quality of analysts' forecasts, more uncertainty, and weaker sensitivity to CEO turnover-performance. As a result, they found that the average long-term performance of acquirers buying during merger waves is on average worse than the returns of those buying off the waves. They identified industry merger wave periods as a 24-month period of high merger volume in each decade and calculated 77 merger waves over a 30-year period. E.Q. Xu (2017) investigated whether cross-border mergers within waves are different from those off waves. In contrast, she found that on the waves, post-merger operating performance and announcement returns are all higher than they are off the waves.

While I look at acquisitions from the sample period similar to the one studied by Duchin and Schmidt (2012), I look at historically defined merger waves rather than manually identified waves. In addition, rather than investigating only long-term stock performance, I perform both short and long-term stock performance studies of domestic as well as cross-border mergers and acquisitions. Lastly, rather than using the one-factor model, like in Duchin and Schmidt (2012), I use the Fama–French three-factor model to better capture the risk.

3. Methodology and Data

Given that this research aims to study the difference in the post-merger corporate performance of acquisitions initiated off and on the merger waves, it is important to attain a non-biased estimate of the wealth effect of merger waves. Like most empirical studies, I look at the short-term and long-term stock performance of acquirers to measure post-merger corporate performance. Although the announcement returns measure the effect of a merger on an acquirer's stock performance during a few days surrounding the announcement date, it is implied that market expectations of the future cash flows resulting from a merger are also reflecting its long-term wealth effect. However, according to the theory of bounded rationality, the market prices the information which is sent by companies often with a behavioral bias of constrained rationality (Rick, McCarthy, Heimeriks, 2021). On the other hand, using long-term stock performance as a measure of the merger wealth effect relies on the violation of the Efficient Market Hypothesis (EMH). In a perfectly efficient market, long-term returns should only reflect the wealth compensation for risk factors that are not specific to a company involved in a merger. While I look at both short-term and long-term abnormal returns, I use the Fama–French three-factor model, rather than the one-factor CAPM model, to better control for risk factors and prevent risk-compensated long-term returns. The analysis includes understanding short-term and long-term returns in a univariate and multivariate regression framework, controlling for other factors that may affect post-merger stock returns.

3.1. Sample Characteristics

Data used in this research is retrieved from the Refinitiv database, Kenneth R. French data library,[2] and the World Bank database.[3] I begin with all mergers and acquisitions

[2] https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html
[3] https://data.worldbank.org/country/united-states

announced between 1977 to 2022, as that is the furthest historical data available on Refinitiv. The following data requirements are imposed:

1. The acquirer is a US publicly listed corporation.
2. The target is not a subsidiary.
3. The transaction value is $50 million or more.
4. The acquirer gained control over a target as a consequence of an acquisition i.e., the percentage of shares held by the acquirer before the announcement is less than 51% and a majority stake of 51% or more after the transaction.
5. The deal was completed.

The data is further filtered for transactions for which acquirer return data is available for three days around the announcement date, and two and three years following the acquisition. Although not recognized as a "seventh merger wave" in the literature, the period from 2014 to 2019 reveals a wave-like pattern.[4] I exclude these years from the sample to avoid misleading results by recognizing this period as a wave or non-wave without literature support. In addition, to prevent the effect of the post-Covid-19 M&A boom on the results as it potentially represents the beginning of a new merger wave that is not yet classified, I exclude the acquisitions after the year 2020. The final sample consists of 4,382 acquisitions of both private and public targets and both US domestic and cross-border mergers, initiated from 1985 to 2013. From these mergers, 2,897 were announced during the fourth, fifth, and sixth merger waves and 1,575 were announced off the wave.

3.2. Measuring Stock Performance

To construct the measure for comparing the post-merger performance of off-wave acquires against that of off-wave acquirers, I used the empirical approach of benchmark-

[4] https://dealogic.com/insight/ma-highlights-3q22/

adjusted short-term and long-term stock performance. *Section 3.2.1* describes short-term stock performance measure while *Section 3.2.2* deals with long-term stock performance measure.

3.2.1. Announcement Returns

Following Bouwman, Fuller, and Nain (2009), I estimate abnormal stock announcement returns for acquirers with a three-day event window around the announcement date, from one day prior to one day after the announcement date of transactions. Instead of using the market model which takes into account only the company's individual CAPM risk, I use Fama–French three-factor model to lessen the CAPM model's drawbacks and hence deliver better benchmark return estimations in the event study. To measure abnormal stock performance, I look at return in excess of the return predicted by the Fama–French three-factor model.

First, to estimate the coefficients on the three factors for each acquirer, I perform the following multivariate regression model.

$$R_i - Rf = \alpha + \beta m_i MRP + \beta smb_i SMB + \beta hml_i HML$$

where $R_i - Rf$ are monthly excess returns of the acquirer i for a five-year period before the announcement date, and MRP, SMB, and HML are factors monthly returns for the same period. One-month US Treasury Note is used for the approximation of risk-free rate Rf.

Next, I calculate the daily abnormal returns of the acquirer by multiplying factor returns with the previously calculated acquirer's individual β factors and deducting them from the acquirer's daily return.

$$AR_{it} = R_{it} - \beta m_i \times Rm_t - \beta smb_i \times Rsmb_t - \beta hml_i \times Rhml_t$$

where R_{it} is a daily return including dividends for the acquirer i on the date t. Rm_t, $Rsmb_t$, $Rhml_t$ are day t returns for the market, small-minus-big, and high-minus-low factors, respectively, and βm_i, βsmb_i, βhml_i are loadings for the market premium, small-minus-big, and high-minus-low risk factors, respectively.

Lastly, the cumulative abnormal returns (CARs) for acquirers are calculated for the three-day event window around the announcement date.

$$CAR_i = \left(\prod_{t=a}^{a+2} (AR_{it} + 1) \right) - 1$$

where CAR_i is a cumulative abnormal return for the acquirer i over a three-day period starting on the day a, one day prior to the acquisition announcement, and AR_{it} is previously calculated abnormal return for the acquirer i on the day t.

3.2.2. Long-Term Returns

To measure the long-term post-merger stock performance of acquirers, I employ the similar method used for measuring short-term stock performance, with extended event windows. Following Malatetsta (1983), I used 24-month and 36-month periods after the announcement date. Using the same volatility measures βm_i, βsmb_i, and βhml_i, I calculate the monthly abnormal returns for acquirers.

$$AR_{it} = R_{it} - \beta m_i \times Rm_t - \beta smb_i \times Rsmb_t - \beta hml_i \times Rhml_t$$

where R_{it} is a return for the acquirer i on the month t and Rm_t, $Rsmb_t$, $Rhml_t$ are month t returns for the market, small-minus-big, and high-minus-low factors, respectively. I proceed with calculating cumulative abnormal returns (CARs) for 24-month, and 36-month periods.

3.3. Regression Framework

To compare the in-wave and out-wave acquirers' performance, I construct univariate and multivariate regressions measuring the effect of merger waves on the four-day, two-year, and three-year abnormal returns for acquirers. Before running any regressions, I winsorize cumulative abnormal stock returns at the 1% level to reduce the impact of extreme observations.

3.3.1. Univariate Framework

In the univariate framework, I perform three regressions using the following model:

$$CAR = \alpha + \beta_1 MergerWaveDummy$$

where CAR is a four-day, two-year, or three-year cumulative abnormal return for the acquirer and $MergerWaveDummy$ is a dummy variable that equals one if a transaction happened during a merger wave and zero if it happened off the wave. The coefficient β_1 estimates the difference between average cumulative abnormal return between acquisitions initiated during merger waves and those initiated off waves.

3.3.2. Multivariate Framework

In order to control for other variables that could affect abnormal returns of acquirers, I run multivariate regressions. Again, I run three regressions with four-day, two-year, and three-year abnormal returns for acquirers as dependent variables. I estimate the following model:

$$\begin{aligned} CAR = \alpha + \beta_1 MergerWaveDummy + \beta_2 StakeAcquired + \beta_3 AvgPreReturn \\ + \beta_4 AcqEBITDA + \beta_5 DealValue + \beta_6 RelativeAcqValue \\ + \beta_7 CrossBorderDummy + \beta_8 HorizontalMergerDummy \\ + \beta_9 TenderOfferDummy + \beta_{10} PoolingDummy + \beta_{11} AcqIndustry \\ + \beta_{12} TargetIndustry + \beta_{13} GDPgrowth + \beta_{14} Inflation \\ + \beta_{15} InterestRate \end{aligned}$$

where CAR and $MergerWaveDummy$ have the same meaning as in the univariate setting. $StakeAcquired$ represents a percentage of stake that was acquired in the transaction. Although one of the imposed requirements was that the acquirer gains control over a target as a consequence of an acquisition, I wanted to account for the fact that e.g., a twenty percent stake purchase has less effect on the company's post-merger performance than a hundred percent stake purchase. Jegadeesh and Titman (1993) outline trading strategies that buy and sell past winners and losers to earn abnormal returns. To prevent the acquirers' pre-announcement stock price behavior to influence my results, I include $AvgPreReturn$, which captures the average daily pre-announcement stock return of the acquirer for 200 days until 30 days prior to the announcement day. Rather than using EBIT which would raise concerns about the effect of

different accounting methods used for depreciation and amortization, I use $AcqEBITDA$, acquirer's LTM EBITDA at the time of the announcement, to control for acquirer's financial characteristics. $DealValue$ was calculated by "subtracting the value of any liabilities assumed in a transaction from the transaction value and by adding the target's net debt" where net debt is calculated as "straight debt plus short-term debt plus preferred equity minus cash and marketable securities, all as of the date of the most current financial information prior to the announcement of the transaction."[5] Following Bouwman, Fuller, and Nain (2009), in order to prevent the abnormal return of the acquiring company to be influenced by the magnitude of acquisition in relation to the acquirer, I include variable $RelativeAcqValue$. It represents the logarithm of deal value divided by the acquirer's market capitalization as of one month prior to the announcement date. E.Q. Xu (2017) argues that cross-border acquisitions encourage effective corporate asset redeployment. Therefore, I include $CrossBorderDummy$ which equals one if the target is not headquartered in the United States, and zero if the transaction is domestic. Similarly, $HorizontalMergerDummy$ has a value of one if the acquirer and the target are from the same SIC industry and zero if the transaction is rather vertical, or unrelated. $TenderOfferDummy$ equals one if the M&A is a tender offer and zero otherwise. Healy, Palepu and Ruback (1992) explain that the accounting method can affect the accounting performance of a company. Pooling-of-interest accounting method dictates how the balance sheets of two businesses were combined during a merger or acquisition. Although this approach was abolished in 2001 by Financial Accounting Standards Board (FASB), since the sample includes transactions prior to 2001, I include $PoolingDummy$ which indicates that the acquirer is using the "pooling of interests" accounting method. To absorb the effect of thirteen industries in the sample, I add $AcqIndustry$ and $TargetIndustry$ variables, each including twelve industry dummy variables. Due to data constraints, I do not include a method of payment as a

[5] According to Refinitiv

regressor, as it would have significantly reduced the sample size when performing regressions. Lastly, to account for the macroeconomic conditions that can influence post-merger returns, I include three macro factors. $GDPgrowth$ represents the percentage growth of the US gross domestic product for the year of the acquisition, $Inflation$ variable represents the percentage increase in the consumer price index in the year of the acquisition, and variable $InterestRate$ embodies the Federal Funds Rate for the month in which the acquisition was announced. The coefficient β_1 estimates the difference between average cumulative abnormal return between acquisitions initiated during merger waves and those initiated off waves, holding all other factors constant.

4. Discussion

4.1. Summary Statistics

Table 1 reports on each numerical variable's mean, standard deviation, median, and the 25th and 75th percentile. First, I report the statistics for the entire sample, and then for two sub-samples, representing acquisitions off and on the merger wave. There are no major systemic differences in the sample between mergers that happened on and off the wave. Not surprisingly, the means of macro factors are statistically different from each other between off-waves and wave periods. In addition, it seems that acquirers from the off-wave subsample had on average a slightly higher EBITDA. Table 2 represents the summary of categorical variables, again, for the entire sample, off-wave periods, and on-wave periods, showing the proportion of mergers to which, each categorical variable applies. Lastly, Table 1 in the Appendix shows the matrix correlation between deal characteristics and Table 2 represents industry classification statistics for the target and acquirer between on-wave and off-wave periods.

Variable	Mean	St.Dev	25TH Percentile	Median	75th Percentile
StakeAcquired	97.43164	10.07456	100	100	100
On Wave	97.46341	9.973717	100	100	100
Off Wave	97.37502	10.25477	100	100	100
t-stat	**(-0.2786)**				
AveragePreReturn	0.0954780	0.2113918	-0.014984	0.082897	0.1921475
On Wave	0.0969298	0.2206379	-0.0133021	0.0827143	0.1919269
Off Wave	0.0928906	0.1938639	-0.0195348	0.0834299	0.1932515
t-stat	**(-0.6069)**				
AcqEbitda	1823.543	4564.126	94.9	319.458	1309.543
On Wave	1683.034	3884.375	94.584	340.4	1384.866
Off Wave	2071.242	5556.563	94.9	295.716	1230.2
t-stat	**(2.6638)*** **				
DealValue	1079.141	4527.606	93 93	188.7484	505.5
On Wave	1173.483	4952.833	91.504	185.572	521.365
Off Wave	911.0026	3644.358	95.166	192.941	490
t-stat	**(-1.8419)**				
RelativeAcqValue	2.579645	1.807121	1.342228	2.461902	3.67161
On Wave	2.595219	1.807121	1.250345	2.443318	3.751213
Off Wave	2.55289	1.807121	1.471275	2.498613	3.564805
t-stat	**(-0.7295)**				
GDPGrowth	2.732218	1.548717	1.841875	2.782811	3.852553
On Wave	3.433292	1.071441	2.782811	3.772565	4.177061
Off Wave	1.482748	1.480107	1.549895	1.841875	2.708857
t-stat	**(50.2081)*** **				
Inflation	2.562117	0.9020514	2.069337	2.677237	3.225944
On Wave	2.810204	0.6080745	2.33769	2.852672	3.225944
Off Wave	2.119971	1.14029	1.586032	2.069337	3.156842
t-**stat**	**(-26.127)*** **				
InterestRate	3.296547	2.370527	1	3.94	5.26
On Wave	4.67876	1.590201	3.98	5.22	5.51
Off Wave	0.8331365	1.285836	0.12	0.17	1.25
t-stat	**(-82.089)*** **				

Table 1: Summary Statistics of Numerical Variables

Variable	On Wave	Off Wave	All
% Cross Border	13.75	15.30	14.31
% Horizontal	76.63	75.81	76.34
%Tender Offer	12.47	7.87	10.82
% Pooling Method	13.72	0.76	9.06

Table 2: Summary Statistics of Categorical Variables

4.2. Returns Distribution

Table 3 represents returns distribution statistics for three-day, and two and three-year cumulative abnormal returns. The average cumulative abnormal announcement returns for the acquisitions initiated during the merger waves is 0.55% lower than for those initiated off the waves. However, two-year and three-year average cumulative abnormal returns for on-waves acquisitions are 2.67% and 4.66% higher than those of the off-wave acquisitions, respectively. The distribution for two-year and three-year returns for acquisition initiated during waves is

substantially skewed to the left. Both sub-samples experience high kurtosis, suggesting heavy-tailed distribution relative to normal, and therefore substantial stock price fluctuations.

		Window		
Variable		3-day	2-year	3-year
Mean	Total	-0.0558809	-2.260333	-3.847794
	On Wave	-0.2533528	-1.299391	-2.172398
	Off Wave	0.2960579	-3.972944	-6.833722
Standard Deviation	Total	5.63194	57.10991	72.63132
	On Wave	5.631958	59.2250	73.7514
	Off Wave	5.616498	53.10724	70.51551
Median	Total	-0.1251115	-6.144162	-8.480887
	On Wave	-0.2476961	-6.576029	-8.803499
	Off Wave	0.0710679	-5.730723	-7.872152
Skewness	Total	0.1635798	0.9479469	0.8697163
	On Wave	0.1191911	1.027852	1.000646
	Off Wave	0.2458064	0.7165018	0.5926762
Kurtosis	Total	5.875261	5.704807	5.251622
	On Wave	5.740345	5.638915	5.442941
	Off Wave	6.122416	5.588227	4.733746

Table 3: Returns Distribution

4.3. Short-Term Stock Performance Study

4.3.1. Univariate Model

In the univariate model preformed for the effect of merger waves on abnormal announcement returns of acquirers, the estimated coefficient on the merger wave dummy variable equals -0.55. The coefficient represents the estimated difference in average abnormal announcement returns between mergers that happened on the wave and those that happened off the wave. Thus, the univariate model indicates that an acquisition initiated during the merger wave has an average abnormal announcement return that is 0.55% lower than that of an acquisition initiated off the wave. The observed p-value equals 0.002 and t-statistics equals -3.10, concluding that the estimated coefficient is statistically significant under all conventional significance levels (10%, 5%, and 1%). Therefore, the univariate framework estimates the effect of merger waves on abnormal stock returns of acquirers to be statistically significant and

different from 0. Table 3 in the Appendix displays the estimation of the univariate model and p-value for the short-term stock performance study.

4.3.2. Multivariate Model

Controlling for the other factors that may influence abnormal announcement returns of acquirers, the multivariate model estimates the coefficient on the merger wave dummy variable at 0.19. Thus, the multivariate model indicates that all other factors held constant, an acquisition initiated during a merger wave has an average abnormal announcement return that is 0.19% higher than that of an acquisition initiated off the wave. Unlike in the univariate model, the coefficient is not statistically significant under any conventional significance level, with a p-value of 0.5 and t-statistics at 0.6. Therefore, although the effect of the merger wave turns out to be positive when accounting for other factors that affect the abnormal announcement returns, it is less statistically significant than the effect estimated in the univariate model. From the factors that are statistically significant, $RelativeAcqValue$ has a non-negligible effect on the cumulative abnormal announcement returns. The regression estimates that a one percent increase in relative deal value to the acquirer's market capitalization increases the announcement returns by 0.15%. In addition, acquirers from the healthcare, energy, and telecommunications sectors have 1.68%, 1.42%, and 1.70% lower average cumulative abnormal announcement returns than those in other industries. Table 4 in the Appendix shows the results of the multivariate model and p-values for the short-term stock performance study.

4.4. Long-Term Stock Performance Study

4.4.1. Univariate Model

Applying the univariate model to the study of the long-term stock performance of acquirers, the results obtained show that an acquisition initiated during a merger wave has an average cumulative two-year abnormal return that is 2.67% higher than the same of an acquisition initiated in an off-wave period. The estimated effect of the merger wave increases

even more for the three-year abnormal returns figure. The estimated coefficient on the merger wave dummy variable equals 4.66 for three-year abnormal returns, implying that the average cumulative three-year abnormal return is almost 5% higher for acquisitions that happened during merger waves. While the coefficient for the three-year study is statistically significant under 10% significance level (p-value 0.04), the estimated effect of merger waves on two-year cumulative abnormal returns has a p-value of 0.14 and therefore does not pass the significance test. Tables 5 and 6 in the Appendix show the estimation of a univariate model for two-year and three-year abnormal returns study.

4.4.2. Multivariate Model

Again, I use multivariate regression to isolate the effect of merger waves on long-term cumulative abnormal returns, from other confounding factors. Like in the short-term stock performance study, results from the long-term stock performance change significantly from univariate to multivariate study, reversing the sign of the merger wave effect on returns. All other factors held constant, an acquisition initiated during a merger wave has an average cumulative two-year abnormal return that is 6.13% lower than that of an acquisition initiated off the wave. In contrast to the univariate study, the coefficient becomes significant under 5% and 10% significance levels (p-value 0.02). From other regressors, only macro factors are statistically significant, implying that two-year cumulative abnormal returns increase by 1.42% and 1.37% with a one percent increase in GDP growth rate and interest rate in the US.

Similarly, the coefficient in a three-year cumulative abnormal return study estimates a 4.7% worse performance of acquisitions initiated during merger waves. However, with a p-value of 0.15, the coefficient does not pass the statistical significance test. Regarding other factors, the results showed the acquirers who bought target companies from the financials industry had a significantly higher average three-year cumulative abnormal return (almost 28% higher) than those acquiring targets from other industries. In addition, with an increase of one

percent in $AvgPreReturn$, capturing the effect of the average daily pre-announcement stock return of the acquirer, the acquirers earn on average 1.84% higher three-year cumulative abnormal return (p-value at 0.003). Tables 7 and 8 in the Appendix display the multivariate model's estimation and p-values for long-term stock performance study.

4.5. Limitations and Further Research

Although the performed analysis on the effect of merger waves on post-merger corporate performance is designed thoughtfully, it is subject to limitations and further research. Most challenges came due to data constraints, especially for acquisitions initiated in far historical periods. As a consequence, the first, second, and third merger waves were excluded from the study. Further filtering for the transactions for which acquirer return data is available for four days around the announcement date, two years, and three years following the acquisition, significantly reduced the sample size. While the majority of data for this study is obtained from the Refinitiv database, other studies were able to acquire data from the Securities Data Corporation's (SDC) US Mergers and Acquisitions Database, which possibly can improve the sample.

Loughran and Vijh (1997) argue that the method of payment influences post-merger corporate performance. However, as displayed in Table 9, data limitations prevent me from controlling for a payment method as only c.20% of the acquisitions in the sample had data available for this factor. Therefore, adding the method of payment as a variable in multivariate regressions would significantly lower the sample size and increase the risk of small sample bias.

While announcement abnormal returns are extensively studied within event studies, isolating the confounding factors in long-term stock performance studies with event windows extended from days to years can often be challenging. Therefore, alternative models such as calendar returns and buy-and-hold abnormal return measures should be performed for comparison purposes. In addition, although stock abnormal returns are the most commonly used

measure of corporate performance, some studies use operational performance metrics. The abnormal operating income could be used as a measure in the same sample to find whether the results are consistent with stock performance analysis.

While the majority of coefficient estimates on the merger wave dummy are statistically significant under all conventional levels, R^2 is quite low for all regressions. Although this is rather reasonable in the panel data set, as a measure of variance in the dependent variable that can be explained by independent variables, it may suggest a non-linear relationship between regressors and cumulative abnormal returns. Therefore, linear transformations of regressors should be considered to correct for non-linearity

5. Conclusion

Motivated by the fluctuating pattern of historical M&A activity, I ask: do acquisitions that are initiated during the historical merger wave have post-merger corporate performance that is fundamentally different from those initiated off the waves?

More specifically, I investigate how acquirers' post-merger stock performance depends on whether the acquisition was initiated on or off the wave. I look at both the short-term and long-term post-merger stock performance of acquirers, both for the purpose of measuring the long-term wealth effect of the merger or acquisition. In contrast to other existing studies on this topic, I use the Fama–French three-factor model to estimate abnormal stock returns of acquirers.

In conclusion of this research, merger waves do influence post-merger corporate performance. The univariate model suggests that cumulative abnormal return for a three-day event window around the announcement day is 0.55% lower for acquisitions initiated during the waves, while two-year and three-year cumulative abnormal returns are 2.67% and 4.66%, higher, respectively. The multivariate model suggests that holding other factors constant, three-day cumulative abnormal return is 0.19% higher for on-wave acquisitions and two-year and three-year cumulative abnormal returns are 6.13% and 4.7% lower, respectively. From the

statistically significant coefficients, the majority suggests the negative effect of merger waves on the post-merger corporate performance, hence value destruction.

One of the possible explanations is that in the setting of the economic rebound in which merger waves were historically initiated, market optimism may induce irrational and therefore value destructive motivations for M&A. In contrast, rational motivations such as greater capital liquidity coupled with cheaper borrowing in booming economies can create a positive M&A effect on corporate performance. Whether positive or negative, merger waves have a significant effect on acquirers' post-merger stock returns. Lacking extensive research on this topic, further work is needed to investigate the effect of merger waves on M&A value creation.

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Appendix

Table 1: Correlation Matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) MergerWaveDummy	1.000										
(2) StakeAcquired	0.010	1.000									
(3) AvgPreReturn	0.015	0.035	1.000								
(4) AcqEBITDA	-0.037	-0.060	-0.057	1.000							
(5) RelativeValue	0.018	-0.082	-0.005	0.392	1.000						
(6) InternationalA~y	-0.018	-0.188	0.006	0.057	0.132	1.000					
(7) PoolingDummy	0.216	0.069	0.105	-0.038	-0.104	-0.090	1.000				
(8) TenderOfferDummy	0.067	-0.006	-0.022	0.068	0.027	0.110	-0.094	1.000			
(9) HorizontalMerg~y	0.003	-0.003	-0.017	0.012	-0.047	-0.027	0.063	-0.045	1.000		
(10) TargetStatus	0.123	0.245	0.017	0.071	-0.193	-0.100	0.188	0.333	0.065	1.000	
(11) TargetIndsustry	0.009	-0.032	0.020	0.030	0.049	-0.003	-0.064	0.019	-0.011	-0.091	1.000
(12) AcqIndustry	-0.004	-0.016	0.023	0.043	0.033	0.006	-0.075	0.049	-0.115	-0.076	0.672

Table 2: Industry Classification and Target Status

Variable	On Wave	Off Wave	All
Acquirer Industry			
% Consumer Services	4.49	6.22	5.11
% Consumer Staples	4.35	3.87	4.18
% Energy and Power	7.77	7.24	7.58
% Financials	18.31	12.63	16.27
% Government and Agencies	0	0.06	0.02
% Healthcare	9.05	14.54	11.02
% High Technology	20.34	20.89	20.54
% Industrials	11.44	11.24	11.36
% Materials	6.02	5.27	5.75
% Media and Entertainment	4.95	2.79	4.18
% Real Estate	5.99	9.97	7.42
% Retail	3.46	3.24	3.38
% Telecommunications	3.85	2.03	3.19
Target Industry			
% Consumer Services	6.23	7.17	6.57
% Consumer Staples	4.35	4.19	4.29
% Energy and Power	7.27	7.56	7.37
% Financials	18.88	13.27	16.86
% Government and Agencies	0.07	0.06	0.07
% Healthcare	8.94	14.41	10.91
% High Technology	21.27	24.06	22.27
% Industrials	9.48	8.63	9.17
% Materials	6.27	4.44	5.61
% Media and Entertainment	4.77	3.62	4.36
% Real Estate	5.34	7.17	6.00
% Retail	3.03	2.79	2.94
% Telecommunications	4.10	2.60	3.56
Target Status			
% Private	44.42	58.41	49.45
% Public	52.80	38.16	47.54
% Government	0.39	0.06	0.27
% Joint Venture	2.39	3.37	2.74

Table 3: Univariate Model for Short-Term Returns Study

announcement_return	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
MergerWaveDummy	-.549	.177	-3.10	.002	-.897	-.202	***
Constant	.296	.142	2.09	.037	.018	.574	**
Mean dependent var		-0.056	SD dependent var			5.632	
R-squared		0.002	Number of obs			4382	
F-test		9.620	Prob > F			0.002	
Akaike crit. (AIC)		27577.133	Bayesian crit. (BIC)			27589.904	

*** p<.01, ** p<.05, * p<.1

Table 4: Multivariate Model for Short-Term Returns Study

announcement_return	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
MergerWaveD	.187	.312	0.60	.548	-.425	.799	
StakeAcquired	-.016	.011	-1.51	.131	-.037	.005	
AvgPreReturn	.516	.411	1.25	.21	-.29	1.321	
AcqEBITDA	0	0	2.31	.021	0	0	**
DealSize	0	0	-4.60	0	0	0	***
RelativeValue	-.153	.058	-2.63	.009	-.266	-.039	***
InternationalAcqD	-.21	.257	-0.82	.414	-.714	.294	
PoolingDummy	-.828	.343	-2.42	.016	-1.499	-.156	**
TenderOfferD	.698	.316	2.21	.027	.079	1.317	**
HorizontalMergD	-.075	.221	-0.34	.735	-.507	.358	
Target Status							
Joint Venture	.656	1.805	0.36	.716	-2.883	4.195	
Private	1.492	1.737	0.86	.39	-1.913	4.897	
Public	-.78	1.738	-0.45	.654	-4.187	2.627	
Target Industry							
Consumer Staples	.323	.701	0.46	.645	-1.052	1.697	
Energy and Power	.728	.684	1.06	.287	-.613	2.069	
Financials	-.389	.724	-0.54	.592	-1.809	1.032	
Government	-2.898	4.189	-0.69	.489	-11.111	5.314	
Healthcare	.823	.565	1.46	.145	-.285	1.93	
High Technology	-.823	.453	-1.82	.069	-1.711	.064	*
Industrials	.297	.5	0.59	.553	-.684	1.277	
Materials	.821	.645	1.27	.203	-.442	2.085	
Media and Entertai	-1.131	.663	-1.71	.088	-2.431	.169	*
Real Estate	.062	.717	0.09	.931	-1.343	1.468	
Retail	-.583	.744	-0.78	.433	-2.041	.876	
Telecomm	-.16	.663	-0.24	.81	-1.46	1.141	
Acquiror Industry							
Consumer Staples	.623	.73	0.85	.394	-.808	2.053	
Energy and Power	-1.416	.7	-2.02	.043	-2.789	-.043	**
Financials	-.552	.766	-0.72	.472	-2.054	.951	
Government and	2.807	6.818	0.41	.681	-10.56	16.173	
Healthcare	-1.685	.594	-2.84	.005	-2.849	-.52	***
High Technology	-.572	.496	-1.15	.249	-1.544	.4	
Industrials	-.282	.509	-0.55	.58	-1.279	.716	
Materials	-1.463	.666	-2.20	.028	-2.768	-.158	**
Media and Entertai	.655	.693	0.95	.344	-.702	2.013	
Real Estate	-1.684	.684	-2.46	.014	-3.024	-.344	**
Retail	-.395	.718	-0.55	.582	-1.804	1.013	
Telecomm	-1.701	.72	-2.36	.018	-3.113	-.288	**
GDP	.078	.07	1.12	.264	-.059	.215	
Inflation	-.233	.109	-2.14	.032	-.446	-.02	**
InterestRate	-.069	.063	-1.09	.274	-.192	.055	
Constant	2.899	2.046	1.42	.157	-1.112	6.91	

Mean dependent var	-0.038	SD dependent var	5.529
R-squared	0.067	Number of obs	4050
F-test	7.255	Prob > F	0.000
Akaike crit. (AIC)	25142.908	Bayesian crit. (BIC)	25401.473

*** p<.01, ** p<.05, * p<.1

Table 5: Univariate Model for Two-Year Returns Study

two_years_return	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
MergerWaveDum	2.682	1.798	1.49	.136	-.842	6.208	
Constant	-3.973	1.439	-2.76	.006	-6.795	-1.152	***

Mean dependent var	-2.260	SD dependent var	57.110
R-squared	0.005	Number of obs	4382
F-test	2.212	Prob > F	0.137
Akaike crit. (AIC)	47886.550	Bayesian crit. (BIC)	47899.320

*** p<.01, ** p<.05, * p<.1

Table 6: Univariate Model for Three-Year Returns Study

three_years_return	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
MergerWaveDummy	4.647	2.285	2.03	.042	.17	9.127	**
Constant	-6.823	1.829	-3.73	0	-10.42	-3.237	***

Mean dependent var	-3.848	SD dependent var	72.631
R-squared	0.001	Number of obs	4382
F-test	4.158	Prob > F	0.041
Akaike crit. (AIC)	49991.631	Bayesian crit. (BIC)	50004.402

*** p<.01, ** p<.05, * p<.1

Table 7: Multivariate Model for Two-Year Returns Study

two_years_return	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
MergerWaveD	-6.136	2.719	-2.26	.024	-11.466	-.806	**
StakeAcquired	-.034	.093	-0.37	.715	-.216	.148	
AvgPreReturn	-1.762	3.581	-0.49	.623	-8.783	5.26	
AcqEBITDA	0	0	0.68	.493	0	.001	
DealSize	0	0	1.14	.252	0	.001	
RelativeValue	.698	.505	1.38	.167	-.292	1.689	
InternationalAcqD	-1.139	2.24	-0.51	.611	-5.53	3.253	
PoolingDummy	-2.285	2.984	-0.77	.444	-8.136	3.566	
TenderOfferD	.288	2.75	0.10	.917	-5.103	5.679	
HorizontalMergD	.988	1.923	0.51	.607	-2.782	4.758	
Target Status							
Joint Venture	-2.312	15.729	-0.15	.883	-33.149	28.524	
Private	-6.015	15.134	-0.40	.691	-35.687	23.656	
Public	-5.699	15.143	-0.38	.707	-35.387	23.989	
Target Industry							
Consumer Staples	10.205	6.109	1.67	.095	-1.771	22.181	*
Energy and Power	-.957	5.96	-0.16	.873	-12.642	10.729	
Financials	13.042	6.311	2.07	.039	.669	25.415	**
Government	-60.457	36.496	-1.66	.098	-132.009	11.095	*
Healthcare	8.152	4.922	1.66	.098	-1.497	17.802	*
High Technology	2.158	3.943	0.55	.584	-5.572	9.888	
Industrials	6.805	4.358	1.56	.119	-1.74	15.349	
Materials	2.125	5.616	0.38	.705	-8.885	13.136	
Media and Entertai	-4.528	5.779	-0.78	.433	-15.858	6.802	
Real Estate	-.446	6.246	-0.07	.943	-12.692	11.8	
Retail	6.078	6.481	0.94	.348	-6.629	18.784	

Telecomm	2.743	5.779	0.47	.635	-8.588	14.073	
Acquiror Industry							
Consumer Staples	8.096	6.357	1.27	.203	-4.368	20.56	
Energy and Power	8.731	6.1	1.43	.152	-3.228	20.69	
Financials	-9.308	6.677	-1.39	.163	-22.4	3.783	
Government and	93.43	59.404	1.57	.116	-23.034	209.894	
Healthcare	4.305	5.175	0.83	.406	-5.841	14.452	
High Technology	4.533	4.319	1.05	.294	-3.935	13.001	
Industrials	.57	4.433	0.13	.898	-8.122	9.262	
Materials	.609	5.8	0.11	.916	-10.763	11.981	
Media and Entertai	7.568	6.034	1.25	.21	-4.263	19.399	
Real Estate	11.472	5.955	1.93	.054	-.204	23.147	*
Retail	-3.699	6.259	-0.59	.555	-15.971	8.572	
Telecomm	-11.3	6.278	-1.80	.072	-23.608	1.007	*
GDP	1.428	.609	2.34	.019	.234	2.622	**
Inflation	1.394	.947	1.47	.141	-.463	3.251	
InterestRate	1.365	.548	2.49	.013	.291	2.44	**
Constant	-8.696	17.826	-0.49	.626	-43.644	26.253	

Mean dependent var	-0.847	SD dependent var	46.999
R-squared	0.020	Number of obs	4050
F-test	2.063	Prob > F	0.000
Akaike crit. (AIC)	42677.933	Bayesian crit. (BIC)	42936.498

*** $p<.01$, ** $p<.05$, * $p<.1$

Table 8: Multivariate Model for Three-Year Returns Study

three_years_return	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
MergerWaveD	-4.727	3.31	-1.43	.153	-11.216	1.763	
StakeAcquired	-.04	.113	-0.36	.72	-.262	.181	
AvgPreReturn	-7.916	4.361	-1.82	.07	-16.466	.633	*
AcqEBITDA	0	0	1.19	.233	0	.001	
DealSize	0	0	1.23	.219	0	.001	
RelativeValue	1.847	.615	3.00	.003	.64	3.053	***
InternationalAcqD	-3.117	2.727	-1.14	.253	-8.464	2.229	
PoolingDummy	.348	3.634	0.10	.924	-6.776	7.472	
TenderOfferD	3.906	3.348	1.17	.243	-2.658	10.47	
HorizontalMergD	.369	2.341	0.16	.875	-4.221	4.959	
Target Status	0	.	.	.	.	.	
Joint Venture	5.752	19.151	0.30	.764	-31.795	43.299	
Private	2.047	18.427	0.11	.912	-34.081	38.175	
Public	-1.435	18.438	-0.08	.938	-37.583	34.713	
Target Industry	0	.	.	.	.	.	
Consumer Staples	6.849	7.438	0.92	.357	-7.733	21.431	
Energy and Power	4.313	7.257	0.59	.552	-9.915	18.542	
Financials	27.89	7.684	3.63	0	12.825	42.955	***
Government	-57.169	44.437	-1.29	.198	-144.291	29.953	
Healthcare	9.652	5.993	1.61	.107	-2.097	21.401	
High Technology	2.901	4.801	0.60	.546	-6.511	12.313	
Industrials	14.05	5.307	2.65	.008	3.646	24.454	***
Materials	3.443	6.838	0.50	.615	-9.964	16.849	
Media and Entertai	-6.58	7.036	-0.94	.35	-20.376	7.215	
Real Estate	1.592	7.605	0.21	.834	-13.319	16.503	
Retail	3.422	7.891	0.43	.665	-12.05	18.893	
Telecomm	7.229	7.037	1.03	.304	-6.568	21.025	
Acquiror Industry	0	.	.	.	.	.	
Consumer Staples	8.205	7.741	1.06	.289	-6.971	23.381	
Energy and Power	1.88	7.427	0.25	.8	-12.682	16.441	
Financials	-22.757	8.13	-2.80	.005	-38.697	-6.817	***
Government and	71.323	72.33	0.99	.324	-70.485	213.13	
Healthcare	6.984	6.302	1.11	.268	-5.37	19.339	

High Technology	5.475	5.259	1.04	.298	-4.836	15.785	
Industrials	-5.935	5.398	-1.10	.272	-16.518	4.648	
Materials	-1.897	7.063	-0.27	.788	-15.743	11.95	
Media and Entertai	9.505	7.347	1.29	.196	-4.9	23.91	
Real Estate	5.15	7.251	0.71	.478	-9.067	19.366	
Retail	-4.771	7.621	-0.63	.531	-19.713	10.17	
Telecomm	-23.034	7.644	-3.01	.003	-38.02	-8.049	***
GDP	2.564	.741	3.46	.001	1.11	4.018	***
Inflation	.802	1.153	0.70	.487	-1.458	3.063	
InterestRate	.97	.667	1.45	.146	-.338	2.279	
Constant	-17.699	21.705	-0.82	.415	-60.252	24.855	

Mean dependent var	-0.432	SD dependent var	57.525
R-squared	0.030	Number of obs	4050
F-test	3.132	Prob > F	0.000
Akaike crit. (AIC)	44272.720	Bayesian crit. (BIC)	44531.286

**** p<.01, ** p<.05, * p<.1*

Table 9: Missing Values for Payment Method

No Source	Freq.	Percent	Cum.
0	925	21.11	21.11
1	3457	78.89	100.00
Total	4382	100.00	