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The German Automobile Industry's Reaction to the Announcement of German Reunification: An Event Study

Rhea E. Rosenlof '91
Illinois Wesleyan University

THE GERMAN AUTOMOBILE INDUSTRY'S REACTION TO THE ANNOUNCEMENT OF GERMAN REUNIFICATION: AN EVENT STUDY

by
Rhea E. Rosenlof
Department of Business Administration

Senior Honors Research Project
Illinois Wesleyan University
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Table of Contents

Introduction

German Reunification has been a worldwide topic of discussion since the collapse of the Berlin Wall in November of 1989. These discussions intensified during the early months of 1990, when it became clear that the German people were determined to reunify their separate nations. On March 18, 1990, in East Germany's first ever free elections since the days of the Weimar Republic, the East German people voted "to push full speed for unity," and the debates surrounding German Reunification began to focus more on questions of when and how, than if (Javetski and Templeman 1990).

The great emotion and excitement of this decision, however, did not overshadow the political and economic uncertainty ultimately linked to the prospect of a united Germany. As one magazine described the atmosphere during the early months of 1990:

> For nearly half a lifetime, the Western world schemed, spied, and propagandized to achieve this outcome, firmly believing it couldn't happen. Now there's no stopping it, and the confusion and fear of what has been wrought are palpable (Javetski and Templeman p. 47, 1990).

During this time, experts within the two Germanys and around the world speculated as to the long range costs and consequences associated with complete economic and political union. Questions were raised concerning the possibility of high inflation and unemployment in East Germany, and the uncertain role of a reunified Germany in an economically integrated Europe.

Despite such uncertainty, Western capital immediately began to flow into East Germany as various Western corporations scrambled to form joint ventures with East German partners. By the East German

vote of March 18, approximately 140 West German corporations had signed up for over 1,000 joint ventures in East Germany (Reichlin, Schares, and Templeman p. 51, 1990). The biggest joint ventures were negotiated in the automobile industry between such corporations as Volkswagen and the builder of the Trabant, General Motors and the manufacturer of Wartburg, and Daimler-Benz and the only truck-maker in East Germany. The automobile industry, therefore, came to be viewed as the "engine of the East German economic recovery" ("The Big Merger" p. 77, 1990).

This study seeks to explore more deeply the economic and political aspects of Reunification and the role of the West German automobile industry in the Reunification process. Due to the importance of the automobile industry in rebuilding the East German economy, an examination of the German automobile industry's reaction to the announcement of Reunification would be an important and informative economic consideration in evaluating the positive and negative consequences of German Reunification. Therefore, through the application of a "special event" methodology utilized in financial research, I intend to discover whether the German automobile industry as a whole, and the individual firms which make up the industry, reacted positively or negatively to the announcement of German Reunification, and what these reactions could mean for the future of the industry and for the future of a united German nation.

This paper details the economic and political outlook in Germany during the early months of 1990, the investments made by the West German automobile industry in East Germany prior to the

announcement of Reunification, and the methodology to be applied in this study. I will then provide an analysis of the automobile industry's reaction to the announcement of German Reunification.

The Economic and Political Outlook

Before beginning the actual analysis of the German automobile industry's reaction to the announcement of Reunification, it is important to first recognize and comprehend the environment in which the financial market was performing during those early months of 1990. The debates of the time focused mainly on two central issues of concern - the political and economic consequences of German Reunification.

The political debate addressed several international concerns, one of the most prevalent being whether a united Germany would be allowed to remain in NATO. Soviet President Gorbachev called for a neutral Germany and for the removal of the 195,000 U.S. soldiers from the German nation. Poland echoed similar sentiments for neutrality; however, fearing Germany's historical "territorial appetite," the Poles favoured allowing American troops to remain in the region ("They Like It" p. 50, 1990). In contrast, the NATO allies - the U.S., France, and Britain - made clear their desire to firmly root a unified Germany in NATO. However, political movements within Germany were divided between neutrality and NATO. A silent majority led by Oskar Lafontaine, leader of the opposition party, called for a German withdrawal from NATO, and the creation of a European defense community to exclude both the Soviet Union and the United States (Schares Feb. 12, 1990).

In addition to the NATO debate, political concerns were raised regarding the European integration planned for 1992, and what role a unified Germany might play in such integration. Fearing that a

united Germany could be too politically and economically dominant, some Europeans pushed for the acceleration of European integration to ensure a "European Germany" and not a "German Europe" (Greenhouse p.A1, 1990). Members of the European community were also concerned that rebuilding the East German economy would lead to high interest rates and high inflation rates for the other member nations. Temporary arrangements for East Germany would also need to be made for pollution control, agricultural subsidies, and regional aid. Protectionism and trade issues were also raised by Douglas Herd, Britain's Foreign Secretary at the time, who commented, "The rest of us will need protection from the entry into our markets of subsidized East German goods," (Javetski and Templeman p. 49, 1990).

Fears of a political revival of fascism were also widespread during the early months of 1990. The British and the Poles appeared particularly worried that the Germans had learned nothing from the past, and many Americans and French shared this view. In the days prior to the East German vote held on March 18, Dutch and Belgian television ran Nazi occupation and Holocaust programs, and one magazine depicted German Chancellor Helmut Kohl wearing a spiked Imperial Army helmet (Javetski and Templeman 1990).

These ongoing political debates created an atmosphere of tension which was complicated further by the economic uncertainty of the time. Economists raised questions regarding whether the possible long range benefits to the German economy would actually be the worth the enormous short-range costs associated with Reunification. West Germany pledged to commit $600 billion over a

period of ten years to rebuild East Germany in a plan described by some as "Mission Impossible" (Reichlin, Schares, and Templeman p . 50, 1990).

However, there were those who argued for Reunification, claiming the economic benefits would far outweigh the initial $600 billion outlay. A unified Germany would have direct control over 22% of Western Europe's economy. In addition, one Germany would boast a gross national product of over a trillion dollars a year with an economy more than 25% larger than that of Great Britain or France. Manfred Melzer, economist with the German Institute for Economics in West Berlin, commented that Reunification would also add a full percentage point to West Germany's annual growth (Greenhouse 1990). The following table, taken from the April 2, 1990, issue of Business Week, indicates how a unified Germany would compare to the largest and second largest economies of the United States and Japan.

Table 1

An Economic Comparison

Between One Germany, the United States, and Japan

	One Germany	United States	Japan
Per Capita GNP	$14,910	$21,018	$22,879
GNP ($billions)	1,373	5,233	2,820
Exports ($billions)	428	624	413
Gross Investment (as % of GNP)	20%	15%	32%

(pp. 46-47)

Proponents of Reunification also argued that a unified Germany would be the major economic power in Eastern Europe. Meinhard Miegel, director of the Institute for Economics and Social Policy in Bonn, stated that Eastern Europe would be "primarily a German market" (Greenhouse p. A1, 1990). Thus, Reunification would position Germany as an economic leader in both Western and Eastern Europe.

However, some economists worried at what costs this leadership would be achieved. Paying for East German pensions and other social programs alone would cost West Germany $13 billion a year. In addition, $8 billion more annually would be tacked onto West Germany's budget deficit. The East Germans themselves were also concerned that they would have to face a "purgatory of inflation and unemployment" if Reunification were to take place ("The Big Merger" p. 76, 1990). The state subsidies in East Germany had kept the prices of such basics as rent and food artificially low, and an open market would cause these prices to rise dramatically. In addition, Helmut Hesse, President of the Landesbank of Lower Saxony, warned that inflation might also result from the following:

1) The extra purchasing power of the East Germans could overstrain West German factories and utilities.

2) The one-to-one proposed conversion rate for Ostmark into Deutschmark could increase the money supply by 13%, much higher than the East German addition to the GNP.

3) The one-to-one conversion wage rate would force East German companies to incur very high costs, making it difficult to them to compete with Western corporations (Silk p. D2, 1990).

In addition to the probabilities of inflation, Reunification

would also be likely to cause significantly high levels of unemployment. As many as three million East Germans, approximately one-third of the labor force, could find themselves unemployed. It was estimated that 15% to 20% of all East German companies would also be put out of business, and surviving companies would be forced to make major layoffs ("The Big Merger" 1990).

Such economic concerns coupled with the political debates surrounding Reunification created a tension-filled atmosphere during the early months of 1990. These concerns were undoubtedly reflected in the performances of German companies in the financial markets at this time. Due to the economic consequences associated with German Reunification, one could reasonably argue that the profitability of certain German corporations would decrease as a result of Reunification. The value placed on these German company stocks would therefore be lowered if Reunification were to take place, and this decrease would be reflected in the stock prices of the firms. However, the positive attitudes of many people during this emotional time may have actually increased the value of some German corporations. Optimistic shareholders may have placed a higher value on the stocks of those companies expected to increase their profitability as a result of Reunification. This expectation and its relation to the German automobile industry will be discussed in greater detail in the "Industry Hypotheses" section of this paper.

The German Automobile Industry

Having explored the political and economic environment during the early months of 1990, it is now important to detail the German automobile industry itself. I have chosen to target the German automobile industry as the focus of this study because the vehicle manufacturing industry is considered to be an important industrial component of the West German economy, and because the industry is also believed to play an important role in the rebuilding of the East German economy. Capital or investment goods manufacturing, which includes machinery production, metal production, and automobile manufacture contributes one-third to the overall industrial output in West Germany. I therefore believe the automobile industry's stock price reaction to the announcement of Reunification is an important economic consideration in the evaluation of a united Germany. In this event study, these reactions will be explored in the context of the financial market's efficiency in responding to new information.

Thus far I have not directly discussed the German automobile manufacturers to be targeted in this event study. However, the three firms to be examined - BMW, Daimler Benz, and Volkswagen - are an important focus of this study, and will, therefore, be discussed in detail in the sections to follow. These particular firms were chosen for analysis due to their prominence in the West European market, and because the stocks of these companies are actively traded on the Frankfurt Stock Exchange. Therefore, daily

stock price data for the firms is readily available. The historical and financial information of these companies which follows is required to effectively interpret the results of this event study. A summary table of pertinent financial information for each target company is provided on page 19.

Bayerische Motoren Werke (BMW)

Originally, BMW was established in Munich in 1916 for the purpose of building airplane engines. The company then began its production of motorcycles in 1923 and added automobiles to its production line in 1928. The business of the company and its various affiliates worldwide included, until recently, only the production of motorcycles and automobiles. (BMW's recent return to the manufacture of engines will be discussed later in this paper). As of December 31, 1989, BMW employed over 66,000 people worldwide (Moody's 1990).

The chairman of BMW is Eberhard von Kuenheim, a man who has run the corporation "like an established monarch for almost two decades...[due to his] uncanny sense of what the market will want next" ("Brilliant" p. 66, 1989). Kuenheim's vision has always been to build better motorcycles and automobiles, and not necessarily to expand the company into other industries as other automobile manufacturers have done. BMW has always remained close to its roots, targeting for takeovers only small high-tech businesses whose performance would have little overall effect on the parent company ("Brilliant" 1989).

Kuenheim's "roots" strategy has done well for the company.

Worldwide sales for BMW have more than tripled over the past ten years from DM 8117 million in 1980 to DM 26,515 million in 1989 (Annual Report of BMW pp. 84-85, 1989). The summary table on page 19 shows the company's improving performance from 1988 to 1989.

The 1989 Annual Report of BMW stated that the future business prospects for the company "remain favourable" (p. 12). BMW considers itself to be in a leading position as a supplier of "exclusive automobiles" and reported that the first quarter 1990 figures had already surpassed the equivalent figures of 1989 (p. 12). The report also reiterated the company's intention of concentrating its production and marketing efforts on the upper market segment. The firm expects that long-term demand in these markets will remain stable (p. 12).

BMW's market plans for the future include the introduction of either a new model or new engine every year into the marketplace, as opposed to its longtime practice of introducing new models every decade. BMW introduced its 7-series in 1986 which has become the top selling car in the over $50,000 price market in Europe. The 5-series model directly followed, selling for between $33,000 and $45,000 and outselling the 7 series four to one. Another BMW model, a 12-cylinder sports coupe selling for over $85,000, was also introduced in the spring of 1990 (Fuhrman, Nov. 27, 1989).

In addition, BMW plans to invest approximately $4 billion in research, design, and new factory automation. This investment strategy comes as a direct result of Japanese competition in the luxury car market in recent years. BMW hopes that such investment, coupled with the freezing and slashing of certain model prices,

will force the Japanese "to play catch-up" (Fuhrman p. 92, Nov. 27, 1989.) In addition, BMW also plans to spend $500 million a year to buy small electronics companies with technological capabilities directly linked to the automobile industry.

In May of 1990, BMW also announced its intention to form a joint venture with Rolls-Royce to build gas turbine engines. This joint venture represents BMW's return to the manufacturing of aircraft engines after a thirty years' absence from the industry. The venture, called BMW Rolls-Royce GmbH, will be located in Oberursel, a city near Frankfurt. The partnership was made possible through BMW's purchase of KHD Luftfahrttechnik GmbH, which manufactures piston engines for unmanned aerial vehicles ("Rolls" 1990).

BMW's Investments in Germany

The following discussion refers to Germany specifically as East Germany or West Germany because Reunification had not yet taken place at the time of the referenced publications. This information is vital to the project, since this event study focuses specifically on those months prior to German Reunification.

According to the 1989 Annual Report of BMW, West Germany continues to be a very important part of the automobile industry because it is Europe's largest car market. New car registrations in West Germany reached 2.83 million units in 1989, and the number of cars on the road rose by one million to 30.15 million units (p. 23). Specifically, the new registrations of BMW cars increased by 28% to 191,000 in 1989, and the demand in West Germany shifted

towards more expensive cars. Therefore, BMW reports its future business prospects in West Germany to be favourable (p. 25).

BMW's position on investment in East Germany must also be addressed in this paper, as I believe this position will have a direct impact on the company's stock price reaction to the announcement of German Reunification. My reasons for this expectation are discussed in the "Industry Hypotheses" section of this paper.

The 1989 Annual Report of BMW states, "Future democracies in the East, based on free market economies will offer [BMW] further opportunities" (p. 15). The report stressed the importance of establishing political conditions for the creation of free market structures, and the successful integration of East Germany and other Eastern countries into a West European economic system. The company's 1989 position on investment in East Germany was stated as follows:

> In the event of an economic upturn in the GDR, a market for BMW cars will develop which, at some future date, will not differ fundamentally from that of the Federal Republic. Currently, BMW is setting up a service network and buying production materials in the GDR. These activities are expected to grow if rapid progress is made towards a free market economy (p. 15).

This position may be best described as conservative in relation to the other two German automobile manufacturers in this study.

Daimler-Benz

Daimler-Benz was incorporated in 1926 through the consolidation of two pioneering German automobile manufacturers. One was formed by Gottlieb Daimler in 1882, and the other was

established by Karl Benz in 1883; both men claimed to be the first person to invent the gasoline powered engine. Unlike rival BMW, Daimler's business activities are fairly diversified and include:

> ...production, marketing and service of passenger cars, ...jet engines, aircraft gas turbines, and stationary diesel engines as well as plants and equipment for production, transmission, and utilization of energy and the communication industry (Moody's p. 1683, 1990).

Daimler-Benz began its diversification in the mid 1980's under the direction of Finance Director and later Chairman, Edzard Reuter. In 1985, the company acquired 100% of MTU, an aircraft engine maker. In this same year, Daimler also purchased 65.6% of Dornier, an aerospace concern, and 56% of AEG, an electronics company. These investments made Daimler-Benz the largest industrial company in West Germany ("Diverse" 1989).

Some consider Reuter's boldest move as chairman to be the creation of Deutsche Aerospace. In the late 1980's, he began an attempt to acquire 51% of Messerschmitt-Bolkaw-Blohm GmbH (MMB), an aerospace corporation. The merger was intended to allow Reuter to consolidate MMB with Daimler's aerospace assets to form Deutsche Aerospace. Such a consolidation can be compared to a merger between Boeing, General Dynamics, Lockheed, and Morton-Thiokol. The venture would supply the West German government "with more than half of its $7 billion in annual military purchases" (Fuhrman p. 92, March 20, 1989). The merger was approved with some restrictions by the West German government on September 8, 1989.

Through this strategy of diversification, Daimler hopes to achieve two main goals. The first is to acquire the technological

expertise in other industries that will complement its own. The second is to avoid complete dependence on the automobile industry market ("Diverse" 1989).

Attaining these goals, however, has caused difficulties for Daimler-Benz. New Mercedes registrations in West Germany fell in both 1987 and 1988. In addition, automobile output dropped by 6.5% in 1988 to 560,000 units. Some believe that Daimler has also been too slow in updating its car models, and newer cars have had various technical problems. These difficulties could prove disastrous for Daimler which, despite diversification, still relies on its automobile sales to provide a majority of its net profit ("Diverse" 1989).

Critics believe that these difficulties are an indication that Daimler may have taken on more than it can handle. BMW Chairman von Kuenheim, whose own company has increased production and raised new car registrations, commented on Daimler, "In one company, you now have the technology for building high-performance cars, electric toasters, and parts for Spacelab" (Fuhrman p. 92, Nov. 27, 1989). Concerns have also been raised by West German politicians who fear that Daimler is becoming too large to regulate. Internally, some employees also worry that Daimler's association with military hardware may affect the company's image as a "prestige-car builder" ("Diverse" p. 66, 1989). Despite these concerns, Daimler has seen an increase in sales and a dramatic increase in net income in recent years as shown in the summary table on page 19.

In addition, Reuter intends to continue his diversification

plans. He is hoping to purchase stakes in other European aerospace companies and has already acquired 5% of MATRA S.A., a French defense contractor. Daimler also announced plans for an alliance between the company and Mitsubishi in March of 1990. The two corporations are planning joint ventures that would combine their businesses in the automobile, aerospace, and consumer electronics industries. Such ventures would grant Daimler entrance into Japan's domestic markets and would put Japan in a good position for the 1992 European Market ("Courtship" 1990).

Daimler's own position for 1992 is already quite strong. The ties it is establishing with other European aerospace companies and the strong position it still holds in the automobile industry could make Daimler "nothing less than the cornerstone of the economically united Europe promised for 1992" (Fuhrman p. 88, March 20, 1989).

Daimler-Benz's Investments in Germany

Headquartered in Stuttgart, Daimler has a strong foothold in the West German market. In 1988, the company held a 10.2% share of the automobile market in the country. In addition, Daimler operates plants in cities throughout West Germany including Dusseldorf, Bad Hamburg, Bremen, Hannover, and Woerth am Rhein (Moody's p.1683, 1990).

Unlike BMW, Daimler made definite plans to invest in East Germany prior to the announcement of Reunification. In early March of 1990, Daimler signed an agreement with the East German motortruck industry to develop and produce commercial vehicles ("Eastward" 1990). Daimler also began negotiating possible

aerospace ventures in East Germany during the early months of 1990. Taking a more proactive stance than counterpart BMW, Daimler's $600 million investment contributes to the $6 billion in Western capital that some analysts estimate will be invested in East Germany annually.

Volkswagen

Volkswagen was originally established as Volkswagenwerk by the German government in the 1930's. This company, then operated by the Reichs Labor Front, was reformed into Volkswagenwerk A.G. in August of 1960. Volkswagen's business activities include the manufacture of cars, busses, special cars, replacements parts, and industrial engines. The company has also expanded into the information technology industry. Headquartered in Wolfsburg, Germany, Volkswagen has a number of affiliates worldwide and employs over 257,000 people (Moody's 1990). The company also currently operates production facilities on every continent excluding Australia.

Many of Volkswagen's acquisitions have been directly related to the automobile industry. In September of 1977, the company signed an agreement with Maschinenfabrik Augsberg-Nuernberg AG to manufacture 15,000 medium sized trucks a year to be sold in West Germany and for export. In 1986, Volkswagen acquired a 75% controlling interest in Socieded Espanola de Automoviles de Turismo S.A., and also formed Pentec Systems in the same year. (Moody's 1990).

Late in 1990, Volkswagen also made several important joint

venture agreements. In November, the company signed an agreement with a Chinese factory, Number One Motor Vehicle Plant of Changchen, to construct an $800 million plant. This plant will manufacture 150,000 Golf Sedans annually for Volkswagen. This is the company's second joint venture in China. The first was a project with another Chinese factory to build Santana Sedans in Shanghai ("Chinese" 1990). In December of 1990, Volkswagen was also chosen for a joint venture with Skoda, the leading Czechoslovakian carmaker of Eastern Europe. The venture will be worth approximately $4 billion over a period of ten years, and Volkswagen will be granted a 25-30% interest in Skoda once the carmaker is reformed into a joint stock company (Bollag 1990).

Volkswagen's Chairman, Carl Hurst Hahn, is known for his "get tough" approach to the industry. Facing high labor costs and declining market share in the late 1980's, Hahn laid out plans to triple the company's net profit margin and cut $1.2 billion from the firm's annual labor costs (Templeman, June 13, 1988). His strategies have apparently done well for the company as seen in the dramatic increase in both sales and net income from 1988 to 1989. (See the summary table on page 19).

Volkswagen's Investments in Germany

Volkswagen operates plants in the West German cities of Wolfsburg, Kassel, Hannover, Brunswick, Salzgilter, and Emden. Volkswagen has also been manufacturing engines in East Germany since 1984.

Of the automobile manufacturers detailed in this study,

Volkswagen made the most significant investments in East Germany prior to the announcement of Reunification. CEO Hahn, who was born in East Germany, committed the company in December of 1989 to a $3 billion car-making venture in his native land. The joint venture with IFA Kombinat will replace the two cylinder Trabant with a small car similar to Volkswagen's Polo and Golf models (Schares Feb. 12, 1990). The Trabant, which one magazine described as a "plastic-enclosed, four-wheel motorcycle posing as a small car" once cost approximately $4000, and East Germans were forced to wait up to fifteen years before they were allowed to purchase one ("The Big Merger" p. 76, 1990). Volkswagen plans to manufacture 250,000 cars annually in Zwickaw by 1994.

Financial experts believe, therefore, that Volkswagen is in an excellent position to take advantage of the shortage of low-priced, quality cars in East Germany. Martin Wade of Rowe-Price-Fleming International states, "Volkswagen has taken a significant lead in establishing ties with East Germany," and he predicted the earnings of Volkswagen would grow 29% in 1990 due to this investment (Serwer 1990).

Table 2

Summary Table:

Financial Comparison of BMW, Daimler Benz, and Volkswagen

(DM Millions)	1988	1989
BMW:		
Sales	24,467	26,515
Net Income	375	386
Daimler Benz:		
Sales	73,495	76,392
Net Income	1,702	6,809
Volkswagen:		
Sales	59,221	65,352
Net Income	780	1,038

(BMW information taken from Annual Report of BMW pp. 84-85, 1989, Daimler Benz and Volkswagen information taken from Moody's p. 1683 and p. 1758 respectively, 1990).

Industry Hypotheses

Earlier in this paper, I briefly discussed that it is reasonable to expect the positive and negative attitudes associated with German Reunification to be reflected in the performance of German corporations in the financial markets. Because I believed that the positive emotional attitudes of shareholders during the early months of 1990 would override the pessimism associated with Reunification, and because I believed the German automobile

industry would experience increased profitability as a result of Reunification, I expected the stock prices of the German automobile industry as a whole to increase as result of the announcement of German Reunification.

I believed that the profitability of the automobile industry would increase due to the opening up and expansion of new markets into East Germany, and because of the opportunities to take advantage of lower labor costs in East Germany. In addition, I also believed that a corporation which had made a direct investment in East Germany prior to the announcement of Reunification would have a competitive advantage over a company which had not made such investments prior to the announcement. The following firm-specific hypotheses are based on this premise that there is a direct relationship between the investments made in East Germany prior to the announcement of Reunification, and the firm's stock price reaction to the announcement.

I expected the most significant stock price reaction to be seen in the returns of Volkswagen, detailed previously as the corporation which made the greatest monetary commitment to East Germany prior to the announcement of Reunification. This investment essentially guaranteed Volkswagen a position in the new East German markets. In addition, Volkswagen was also in a good position to enter the East German markets successfully because the company offers a low-priced automobile which is undoubtedly more affordable to East German consumers than the automobiles of Daimler-Benz or BMW. I therefore expected that Volkswagen's strong market position would lead to increased profitability for the firm

and an increase in the stock returns of the company. In the case of Daimler-Benz, I believed the firm would also show a definite positive reaction to the announcement. However, I did not expect the stock returns of this company to be altered as significantly as those of Volkswagen due to Daimler's lower monetary commitment to East Germany. Finally, I expected to see only a slight positive change in the stock returns of BMW because of the firm's conservative stance towards investment in East Germany prior to the announcement of Reunification. This slight positive reaction was based on the potential for future investments to be made in East Germany as a result of Reunification.

Event Study Methodology

The next section of this project discusses the methodology to be utilized in this particular study. I intend to apply an event study methodology detailed in several financial journals to explore the German automobile industry's reaction to the announcement of Reunification. In his article "How do Stock Returns React to Special Events," Robert Schweitzer describes event studies:

> To provide some insight into how the equities market reacts to new information, financial economists have conducted "event studies," statistical techniques for analyzing the pattern of stock prices and returns when a special event occurs (p. 173).

The event study has become one of the most popular and most frequently used analytical tools in financial research. The purpose of such studies is to examine the financial markets' reactions to a particular event through the examination of stock

prices observed around that event. This examination reveals if any "abnormal" returns were earned by shareholders as a result of the specific event (Peterson 1989).

Robert Schweitzer (1989) notes that if an event is interpreted as good news for a particular firm, the firm's stock price will increase as a result. This increase, or capital gain, will then increase the return on the firm's stock. Therefore, it follows that if the event is considered to be bad news, the firm's stock price would decrease representing a capital loss. This loss would then lower the return on the firm's stock. Schweitzer cautions, however, that such changes in stock returns may be caused by factors other than a specific event. The "overall movement" of the financial market may cause the change, and event studies must account for such movement when analyzing market reaction to a specific event (p. 18). As discussed later in this paper, the event study methodology employed by financial researchers does take such overall market movement into account.

While there are various uses for the application of event study methodology (e.g., mergers, buyouts, stock splits), the basic steps employed in conducting an event study appear to be fairly uniform. Henderson (1990) outlines the following "classic" event study process to be applied in this study:

1) Define the date upon which the market would have received the news.

2) Characterize the returns of the individual companies in the absence of this news. (normal returns)

3) Measure the difference between observed (actual) returns and "no-news" returns for each firm - the abnormal returns.

4) Aggregate the abnormal returns across firms and across time.

5) Statistically test the aggregated returns to determine whether the abnormal returns are significant, and if so, for how long (p. 284).

Definition of the Event

The definition of the exact event date, although appearing a simple task, is actually a rather complicated process. As Henderson (1990) relates, "The issue is not when an event occurred, but when the market...could have reasonably anticipated the news" (p. 284). Selecting an event date, therefore, is difficult because the exact timing of a specific event is often unknown.

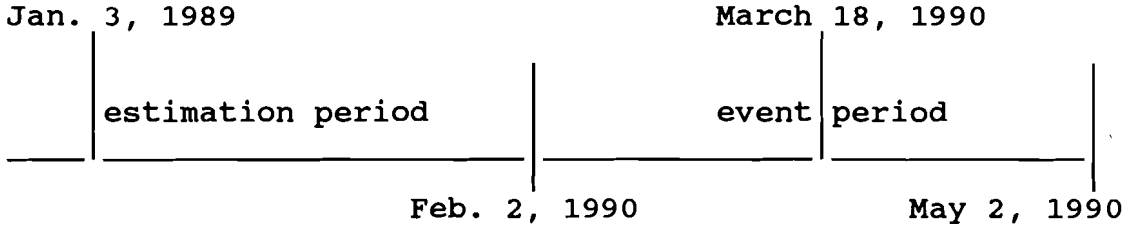
After researching the important dates associated with the process of Reunification, I have decided to use March 18, 1990, as the event date for this study. This date was discussed earlier as the day that East Germans voted to remove all obstacles preventing unification with West Germany. This election for the new East German parliament was described as "a portent of the future shape of Europe" (Schares p.63, March 19, 1990). I therefore targeted March 18, 1990, as the day of the announcement of German Reunification.

Characterization of Normal Returns

The normal returns for a security are those returns expected in the absence of the event. In the case of this study, the normal returns would be those returns which were completely unaffected by the vote of March 18. These normal returns are calculated during

the estimation period - a certain length of time other than the period immediately surrounding the event date (Henderson 1990; Peterson 1989).

Peterson (1989) suggests "For applications in which the determinants of the normal return are not expected to change due to the event, an estimation period typically is chosen prior to the event period" (p. 37). Because the determinants of the normal returns are not expected to change due to the announcement of Reunification, the normal returns in this study will be estimated over a period prior to March 18, 1990. The following time line based on Peterson's (1989) model illustrates the determination of normal returns during a period prior to the event date, specifying the dates to be used in this event study:



where January 3, 1989 = The first period used in the estimation of a normal security return for each firm

February 2, 1990 = The first period used in the calculation of abnormal returns for each firm

March 18, 1990 = The event period

May 2, 1990 = The last period used in the calculation of abnormal returns for each firm (p. 38).

The typical estimation period ranges from 100 to 300 days for daily studies and 24 to 60 months for monthly studies (Peterson

1989). This particular event study will focus on an estimation period of 120 days because I intend to use daily, rather than monthly, stock price information for BMW, Daimler Benz, and Volkswagen. The potential problems of using daily data due to non-normality and non-synchronous trading (stocks listed daily but not traded daily) will be addressed later in this paper.

The event window is the number of days, weeks, or months surrounding the chosen event date (Henderson 1990). This window is used to observe the actual returns of a firm over an appropriate period of time. To conduct this study, I have arbitrarily chosen to observe stock prices for a period of 30 days prior to and 30 days after March 18, 1990, to determine the actual returns for each company. It is also important to note that for the purposes of this study, the daily stock price data will be the sole determinant of normal and actual returns (e.g., no dividend data are included). Therefore, any references made to stock "returns," actually refers only to the stock prices of the firms in this study.

Estimation of Normal and Abnormal Returns

In conducting event studies, there are various techniques used to estimate normal returns. In past studies, researchers have relied on the use of mean-adjusted models, market-adjusted models, or market models (Schweitzer 1989). This particular event study will utilize the OLS (Ordinary Least Squares) market model to estimate the regression parameters in the following equation:

$$R_{jt} = \alpha + \beta R_{mt} + E_{jt}$$

where R_{jt} = The observed return on the security of firm j in time period t (the stock return observed during the estimation period)

α, β = The regression parameters

R_{mt} = The return on the market (The change observed in the 1989 market index over the estimation period)

and E_{jt} = The error term for time period t

This regression analysis will be performed on data for BMW, Daimler Benz, and Volkswagen for a period prior to the event, designated previously as January 3, 1989, through June 30, 1989, so that resulting parameter estimates are not "contaminated" by the influence of the event - in this case, the announcement of German Reunification. After the parameters are estimated, the security's normal returns during the event period will then be estimated using α, β and the return on the market (change observed in the 1990 market index over the event period) by substituting into the following equation:

$$R_{jt} = \alpha + \beta R_{mt}$$

The abnormal returns will then be calculated as the difference between the estimated normal returns and the actual returns observed between February 2, 1990 and May 2, 1990:

$$AR_{jt} = R_{jt} - \hat{R}_{jt}$$

where AR_{jt} = the abnormal return for time j in period t

R_{jt} = the observed return for firm j in time period t (the actual return)

and $\hat{R}_{jt}$ = the "normal" return for firm j in time period t (the estimated return)

This model recognizes the fact that very few stocks actually move one-for-one with the market because of differences in their sensitivity to system-wide economic changes. These "normal" return estimates explicitly consider a stock's sensitivity to these factors (as captured by ß, its beta coefficient).

Aggregation of Abnormal Returns

Before conducting significance testing, the abnormal returns must be aggregated across firms and across time (Henderson 1990). The cumulative abnormal return for BMW, Daimler Benz, and Volkswagen will be calculated using the abnormal returns calculated for each firm:

$$CAR_{jt} = \Sigma_t \, AR_{jt}/n^{(1/2)}$$

where CAR_{jt} = the cumulative abnormal return for firm j in time period t

AR_{jt} = the abnormal return for firm j in time period t

n = the number of periods to date

The cross-section average abnormal returns for the German automobile industry will be calculated by using the following equation:

$$AAR_t = \sum_{j=1}^{N} AR_{jt}/N$$

where AAR_t = the average abnormal return for time period t

AR_{jt} = the abnormal return for firm j in time period t

N = 3, the number of firms in this study

These abnormal returns will then be summed algebraically to find the cumulative average of abnormal returns for the industry:

$$CAAR_t = AAR_t + CAAR_{t-1}$$

where $CAAR_t$ = the cumulative average abnormal return for time period t

Standardization of Abnormal Returns

The abnormal returns calculated in the previous section will then be standardized in order to conduct significance testing. The abnormal returns must be standardized to reflect any statistical error in the calculation of expected or predicted returns (Peterson 1989). If simple regression analysis is employed to determine expected returns, as is the case in this study, Peterson (1989) states:

> This standard error of the forecast is based upon the standard error of the estimate from the original regression analysis using estimation period returns (p. 43).

For the purposes of this study, the standard error of the estimate will be used as the standard error of the forecast. Although not precisely statistically correct, this substitution has been applied in past event studies with little effect upon the outcome of the statistical tests.

The standard error for each firm used to calculate the standardized abnormal returns will be taken directly from the original OLS regression analysis performed to estimate the

regression parameters (α,β). The equations utilized to standardize the abnormal returns and cumulative abnormal returns can be found in the Appendix of this research paper.

Upon completion of the statistical testing, graphics will be used to provide interpretation of the abnormal returns and cumulative abnormal returns calculated for BMW, Daimler Benz, Volkswagen, and the German automobile industry. This approach is consistent with event study methodology as recognized in finance literature (Henderson 1990).

Non-normality and Non-synchronous Trading

Earlier in this paper, I discussed how utilizing daily stock price information, as I did in this study, can cause potential difficulties in conducting event studies. These difficulties are associated with the non-normality and non-synchronous nature of daily information. Stephen J. Brown and B. Warner address these very issues in their article "Using Daily Stock Returns." In the article, they state:

> The daily stock return for an individual security exhibits substantial departures from normality that are not observed with monthly data...distributions of daily returns are fat-tailed relative to a normal distribution (p. 4).

In addition, Brown and Warner indicate that non-synchronous trading (stocks which are not traded daily) can make OLS parameter estimates (α,β) biased and inconsistent (p. 5). Because the OLS method will be used to estimate the alpha and beta coefficients for each company in this study, I feel the following discussion is pertinent to my particular project.

Brown and Warner (1985) conducted a study analyzing the effects of using daily stock price information to conduct event studies. In this study, 250 samples of 50 securities were analyzed. The results of this study indicated that "the non-normality of daily returns has no obvious impact on event study methodologies" (p. 25). In addition, the study showed that there are no definite benefits in utilizing a model other than OLS for parameter estimations in the presence of non-synchronous trading. In conclusion, the researchers found that the use of daily data in conducting event studies is "straightforward," and the characteristics of daily stock price data do not usually cause difficulty in applying event study methodologies (p. 25-26). These results indicate that the methods I chose to conduct this study are indeed consistent with event study methodology.

Method

Overview

The empirical section of this project which follows utilized event study methodology to discover if any abnormal returns were earned or lost by the shareholders of BMW, Daimler Benz, and Volkswagen as a result of the announcement of German Reunification on March 18, 1990.

Procedure

Daily stock price data were collected for BMW, Daimler Benz, and Volkswagen from the daily listing of the Frankfurt Stock Exchange in the Wall Street Journal. The stock price information for the estimation period was collected over a period of 120 days - from January 3, 1989, to June 30, 1989. The stock price information for the event period was collected over 60 days - from February 2, 1990, to May 2, 1990. The changes in the Frankfurt DAX (market index) were also observed over the same estimation and event periods. The stock price information for March 20, 1990, had to be excluded from the study due to a misprint in the Frankfurt DAX listed in the Wall Street Journal. In addition, any other gaps in the data collected can be attributed to market closings and weekends. The results of the regressions and calculations performed on the data are detailed in the sections to follow.

Results and Analysis

Using the data collected for BMW, Daimler Benz, Volkswagen, and the Frankfurt DAX over the estimation period, regression analysis was performed to estimate the parameters of the regression (α,β). The alpha and beta coefficients estimated for each company are summarized in Table 3 below.

Table 3

Regression Analysis Results:
Parameter Estimates for BMW, Daimler Benz,and Volkswagen

Company	Estimated α	Estimated β	r^2
BMW	-.000078952	.795239036	47.4%
Daimler Benz	-.001318195	.977003279	47.1%
Volkswagen	-.000832730	1.122589799	46.9%

As this table indicates, both BMW and Daimler Benz have estimated betas which are less than one, and Volkswagen has an estimated beta greater than one. Because the beta coefficient is a measurement of a stock's risk (stocks of average risk having betas = 1.0), the stock of Volkswagen is apparently considered to be more risky, and therefore, more volatile than the stocks of either BMW or Daimler Benz. One would therefore expect to see more movement in the stock returns of Volkswagen. The r^2 values in the table represent how much of the company-specific or unsystematic risk is explained by the regression analysis. The percentages for

BMW, Daimler Benz, and Volkswagen all cluster near 50%, which is a fairly high percentage in the measurement of a firm's unsystematic risk.

As detailed in the event methodology section of this paper, the estimated alpha and beta coefficients were used to calculate the expected or "predicted" normal returns for each firm. The abnormal returns were then calculated by subtracting these expected returns from the actual returns. The resulting abnormal returns for BMW, Daimler Benz, and Volkswagen are graphed on the following pages (Figures 1-3) to provide a clear picture of the higher than "normal" and lower than "normal" rates of return earned by shareholders throughout my event period. The abnormal returns for each firm and for the German automobile industry as a whole were then cumulated over time and graphed to provide a more in-depth analysis of my results (Figures 4-7). Both the abnormal returns and the cumulative abnormal returns were also tested for significance at $\alpha = .05$, which requires an absolute value greater than 1.886 to be considered significant. The results of these tests can be found in the accompanying tables.

Abnormal Returns. March 19, 1990, was designated as Day 0 in each of the following graphs. This date was used instead of March 18, because March 19, a Monday, was the first day the Frankfurt Stock Exchange was open following the East German vote. The event periods for all the firms have been narrowed from 29 to 25 days prior to and 25 days after Day 0 for graphing purposes. Although a window of only a few days is actually required for examination, these graphs include almost the complete event period (February 19,

1990, to April 17, 1990) in order to provide a general overview of the abnormal returns calculated in this study.

Looking at Figures 1, 2, and 3, for BMW, Daimler-Benz, and Volkswagen respectively, the graphs indicate the random movements of the abnormal returns around 0 throughout the event period. Figures 1 and 2 indicate that both BMW and Daimler Benz experienced a great deal of movement towards the beginning and towards the end of the event period, with rates of return clustering fairly close to 0 in the days surrounding the March 18 vote. Because the market is assumed to be an efficient system which responds immediately to new information, these higher than "normal" and lower than "normal" returns at the edges of my event window cannot realistically be attributed to the announcement of Reunification on March 18.

Comparing the abnormal returns of BMW (Figure 1) and Daimler-Benz (Figure 2) to those of Volkswagen (Figure 3), one notices that Volkswagen experienced a great deal more random movement during the several days prior to my event date. This increased movement indicates a certain level of shareholder uncertainty which may be associated with the anticipation of the vote on March 18, and is consistent with the higher risk (higher beta) of Volkswagen's stock, which results in more volatility, and thus more movement, than the stock of BMW or Daimler-Benz. It's also interesting to note that an abnormal return of nearly 3.0% was earned by Volkswagen shareholders immediately following the East German vote on March 18. A detailed discussion of this reaction is provided later in this paper.

Standardized Abnormal Returns. Significance testing was

Figure 1

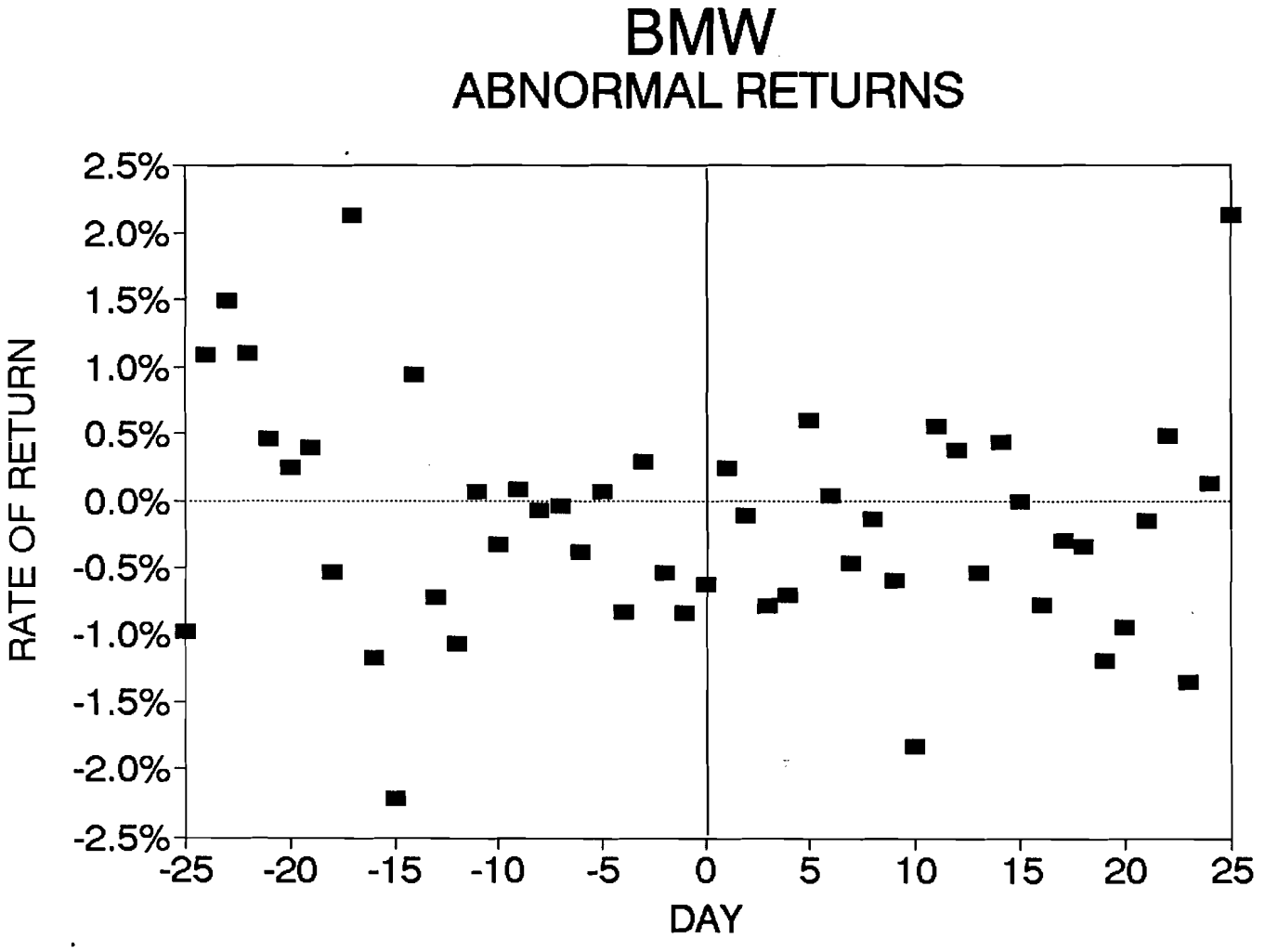

BMW
ABNORMAL RETURNS
RATE OF RETURN
2.5%
2.0%
1.5%
1.0%
0.5%
0.0%
-0.5%
-1.0%
-1.5%
-2.0%
-2.5%
-25
-20
-15
-10
-5
0
5
10
15
20
25
DAY

Figure 2

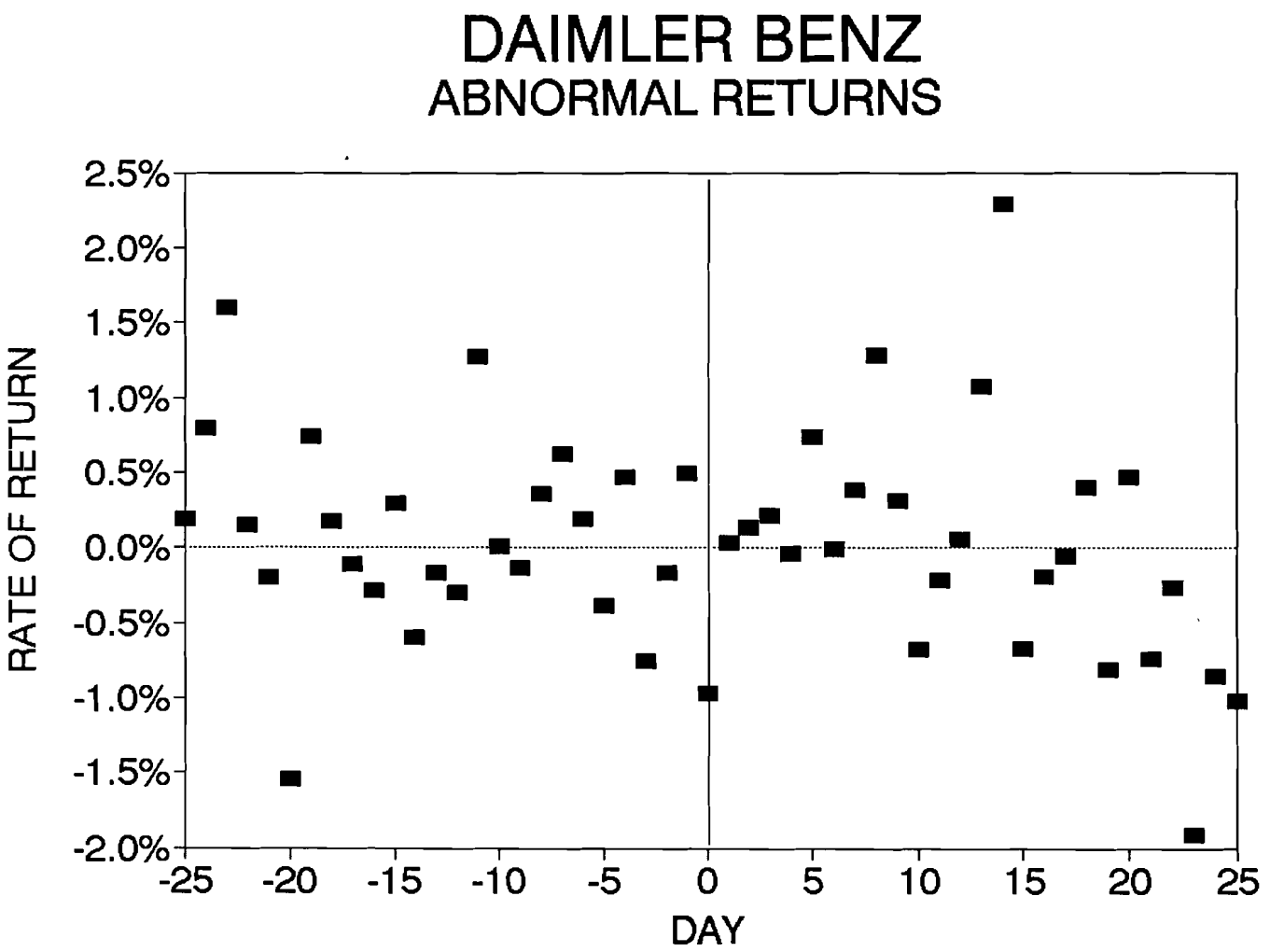
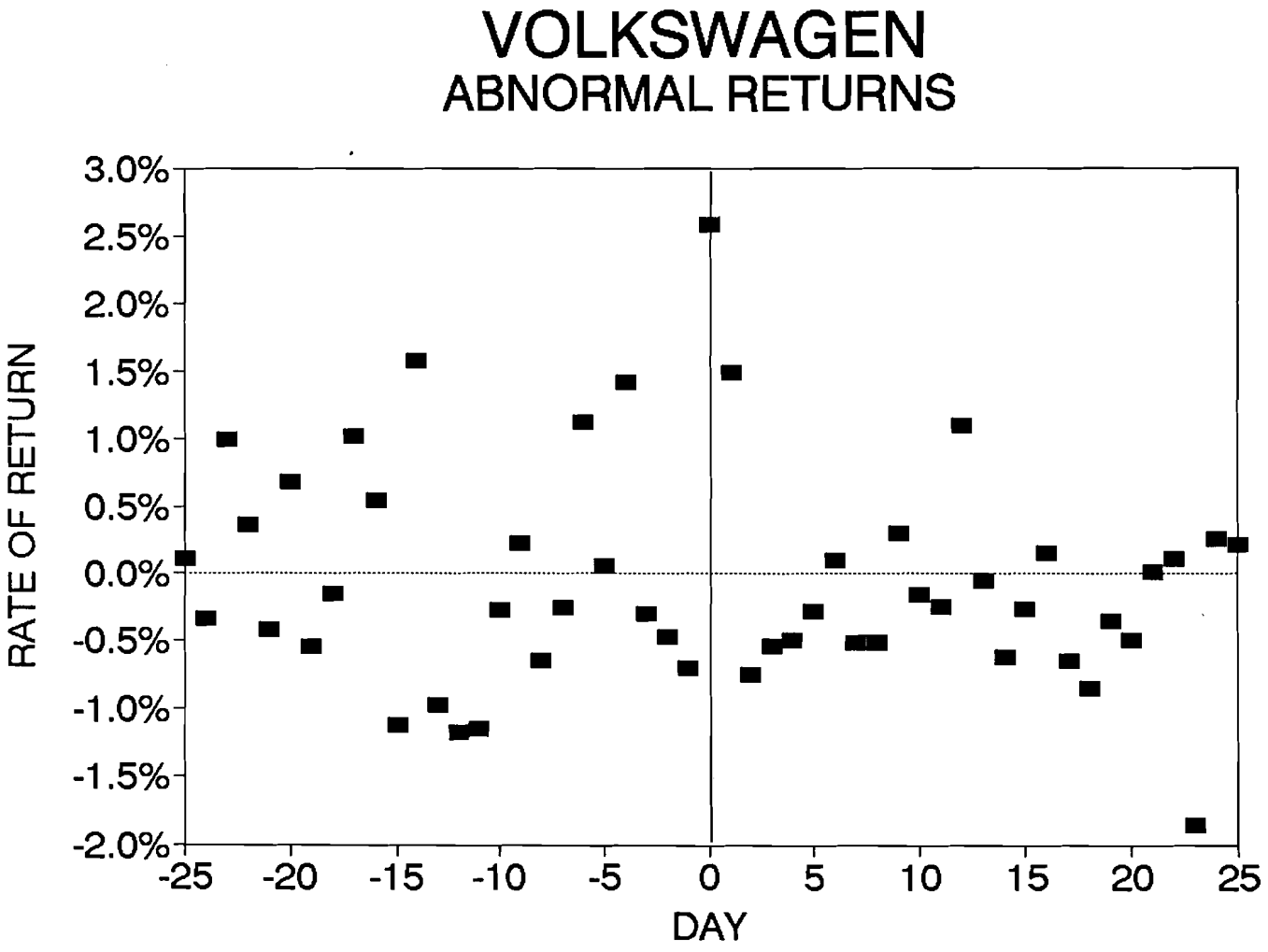

DAIMLER BENZ
ABNORMAL RETURNS
RATE OF RETURN
2.5%
2.0%
1.5%
1.0%
0.5%
0.0%
-0.5%
-1.0%
-1.5%
-2.0%
-25
-20
-15
-10
-5
0
5
10
15
20
25
DAY

Figure 3


VOLKSWAGEN
ABNORMAL RETURNS
RATE OF RETURN
3.0%
2.5%
2.0%
1.5%
1.0%
0.5%
0.0%
-0.5%
-1.0%
-1.5%
-2.0%
-25
-20
-15
-10
-5
0
5
10
15
20
25
DAY

conducted on the standardized abnormal returns of BMW, Daimler Benz, and Volkswagen over the entire sixty-day event period (from February 2, 1990, to May 2, 1990). The only significant returns for BMW were found nearly a month, and then again approximately three weeks prior to the East German vote, indicating the presence of an event which may or may not have anything to do with the Reunification process. (See Table 4)

Table 4

Results of Significance Testing on the Abnormal Returns of BMW, Daimler Benz, and Volkswagen

Company	Day	Abnormal Return	T-Statistic
BMW	-3	.0029	.4087
	-2	-.0053	-.7464
	-1	-.0083	-1.1717
	0	-.0063	-.8807
	1	.0025	.3445
	2	-.0011	-.1503
	3	-.0078	-1.1018
Daimler Benz	-3	-.0075	-.8518
	-2	-.0017	-.1916
	-1	.0048	.5506
	0	-.0097	-1.1021
	1	.0003	.0299
	2	.0014	.1568
	3	.0022	.2460
Volkswagen	-3	-.0029	-.2901
	-2	-.0046	-.4547
	-1	-.0070	-.6901
	0	.0258	2.5397*
	1	.0149	1.4691
	2	-.0075	-.7411
	3	-.0054	-.5307

* significant at α = .05

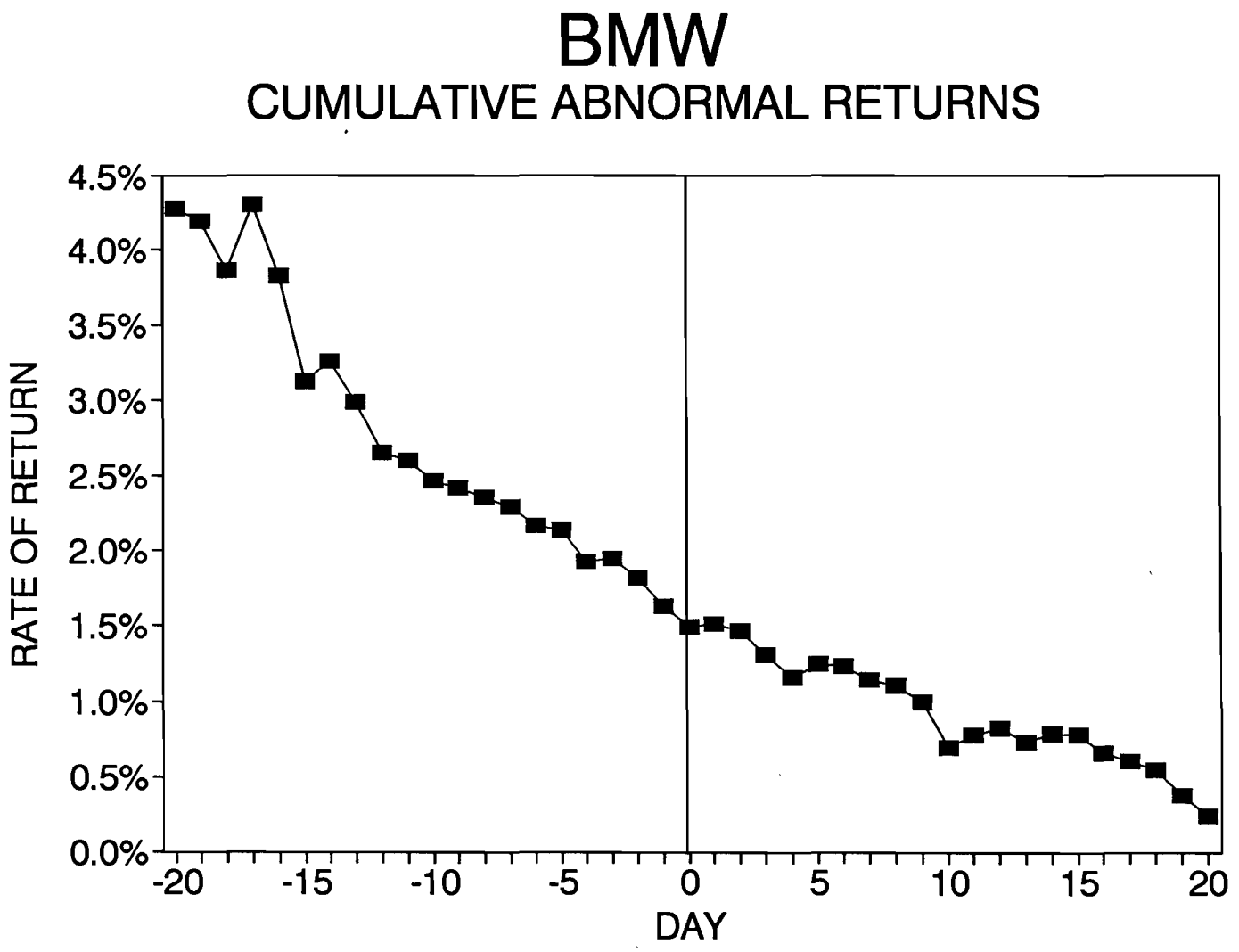
The only significant abnormal return for Volkswagen was found at Day 0, the day after the East German vote took place. However, the returns become insignificant immediately afterwards indicating that the event did not have a sustained positive effect on the returns of Volkswagen. In addition, no significant results were discovered at any time during the event period for Daimler Benz, including those few days prior to and following my event date.

The failure to find any sustained significant results in the standardized abnormal returns of BMW, Daimler Benz, and Volkswagen in the days surrounding my event date is a preliminary indication that the announcement of German Reunification on March 18, 1990, may have been a non-event for the German automobile industry.

Cumulative Abnormal Returns. The cumulative abnormal returns for each firm and for the German automobile industry are graphed in Figures 4-7 on the following pages. Once again, March 19, 1990, is was designated as Day 0, and the event period has been narrowed further to 20 days prior to and after Day 0 for graphing purposes.

Looking first to the cumulative abnormal returns of BMW (Figure 4), the graph indicates that there are no significant declines or increases in the abnormal rates of return which can be attributed to the announcement of Reunification on March 18. In fact, the graph reveals that the market neither anticipated nor responded to my event date as the returns steadily decline throughout the period. The slight increase in returns which I hypothesized I would see following my event date is clearly not present. The higher than "normal" rates of return throughout the

Figure 4


BMW
CUMULATIVE ABNORMAL RETURNS
RATE OF RETURN
4.5%
4.0%
3.5%
3.0%
2.5%
2.0%
1.5%
1.0%
0.5%
0.0%
-20
-15
-10
-5
0
5
10
15
20
DAY

event period, however, do indicate that the market was responding to an event that must have taken place prior to the beginning of my event period. This event may or may not have been directly related to the process of Reunification. The returns are declining, which suggests that this graph may depict the tail end of the market response to that previous event. Therefore, my results indicate that the fact that BMW took a very conservative stance towards Reunification and made no monetary investments in East Germany prior to March 18, 1990, apparently had absolutely no effect on the stock returns of the company - positive or negative.

After conducting significance testing on the cumulative abnormal returns for BMW over my entire event period, I found there was an extended period of significant abnormal returns from February 6, 1990, to March 12, 1990. As stated earlier these higher than "normal" rates of return are undoubtedly the response to a specific event occurring before my event period. I also discovered significant returns just prior to and after my event date. However, these returns are part of the tail-end response to the event occurring prior to my event period, and therefore, cannot be attributed to the vote on March 18. I therefore concluded that March 18 was a non-event for BMW. (See Table 5 on the following page).

Table 5

Results of Significance Testing on the Cumulative Abnormal Returns of BMW

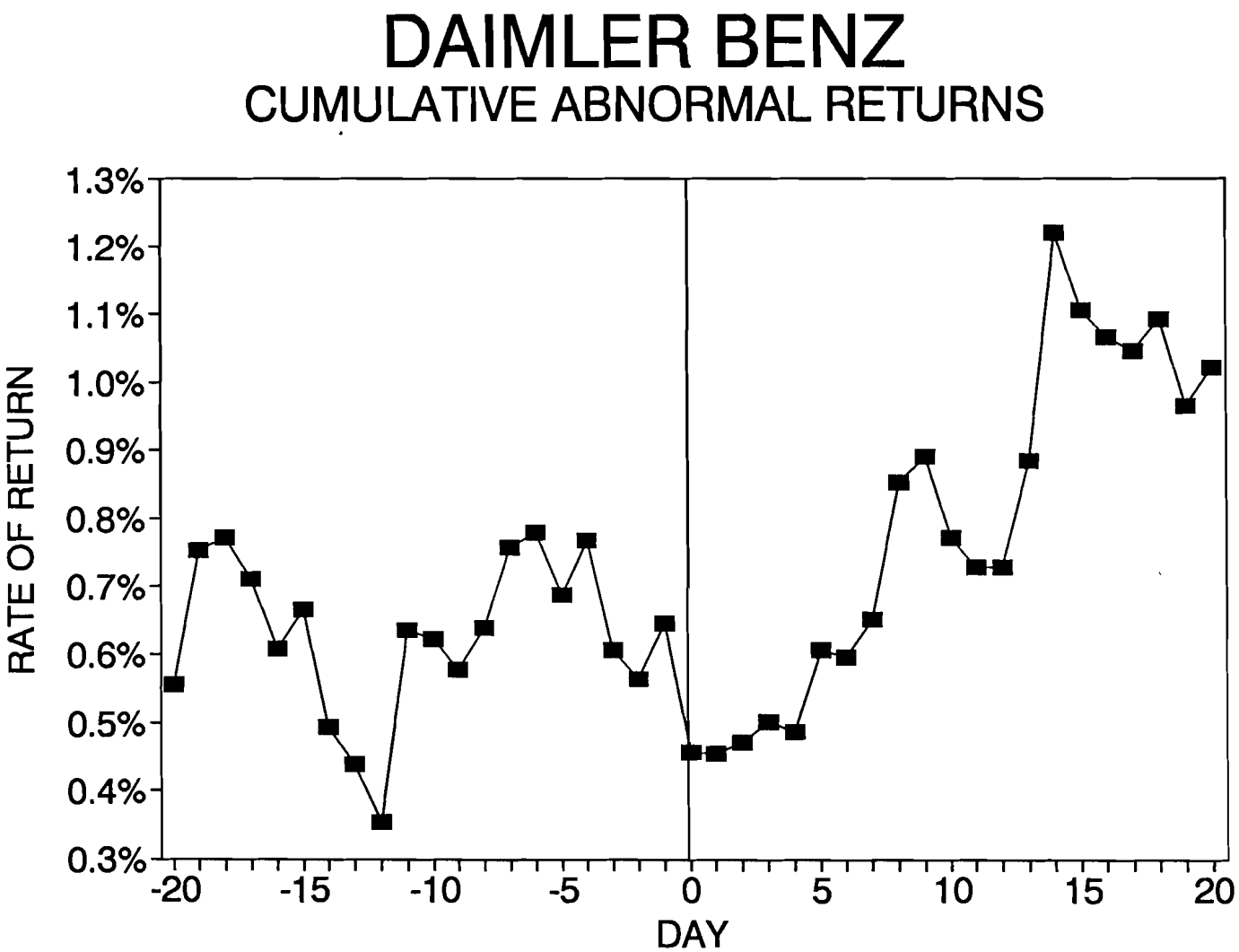
Day	Cumulative Abnormal Return	T-Statistic
-3	.019487	2.738511*
-2	.018132	2.548114*
-1	.016268	2.286225*
0	.014851	2.087003*
1	.015049	2.114935*
2	.014623	2.055058*
3	.013035	1.831882

* significant at $\alpha = .05$

The cumulative abnormal returns for Daimler-Benz are graphed in Figure 5. These cumulative returns exhibited a great deal more movement than the returns of BMW prior to and after my event date, however, once again, there is no significant movement which can be directly attributed to the East German vote of March 18. There is a definite upward trend in the returns of Daimler which begins approximately six days after Day 0. This trend indicates one of two possibilities. Either the market was extremely inefficient, and it actually took six days to respond to the announcement of March 18, or, more likely, the efficient market system of rational investors was actually responding to an event which took place a few days after Day 0. Once again, this event may or may not have been directly related to the German Reunification process.

As seen in the returns of BMW, these Daimler-Benz returns also

Figure 5


DAIMLER BENZ
CUMULATIVE ABNORMAL RETURNS
RATE OF RETURN
1.3%
1.2%
1.1%
1.0%
0.9%
0.8%
0.7%
0.6%
0.5%
0.4%
0.3%
-20
-15
-10
-5
0
5
10
15
20
DAY

remained higher than "normal" during the event period. This again suggests that the market may have been responding to an event which occurred sometime prior to my event period. However, there is no increasing or decreasing pattern of abnormal returns prior to or after Day 0 to indicate the market's anticipation of or response to the announcement of Reunification on March 18. Therefore, the fact that Daimler-Benz did make a substantial investment in East Germany prior to the March 18 vote, did not result in an increase in the stock returns of the company as a result of the announcement of German Reunification.

In conducting significance testing on the cumulative abnormal returns of Daimler-Benz, I found no significant results at any time during my event period, including those days immediately preceding and following Day 0. (See Table 6 on the following page). Because of this, I concluded that the announcement of Reunification on March 18 was also a non-event for Daimler Benz.

Table 6

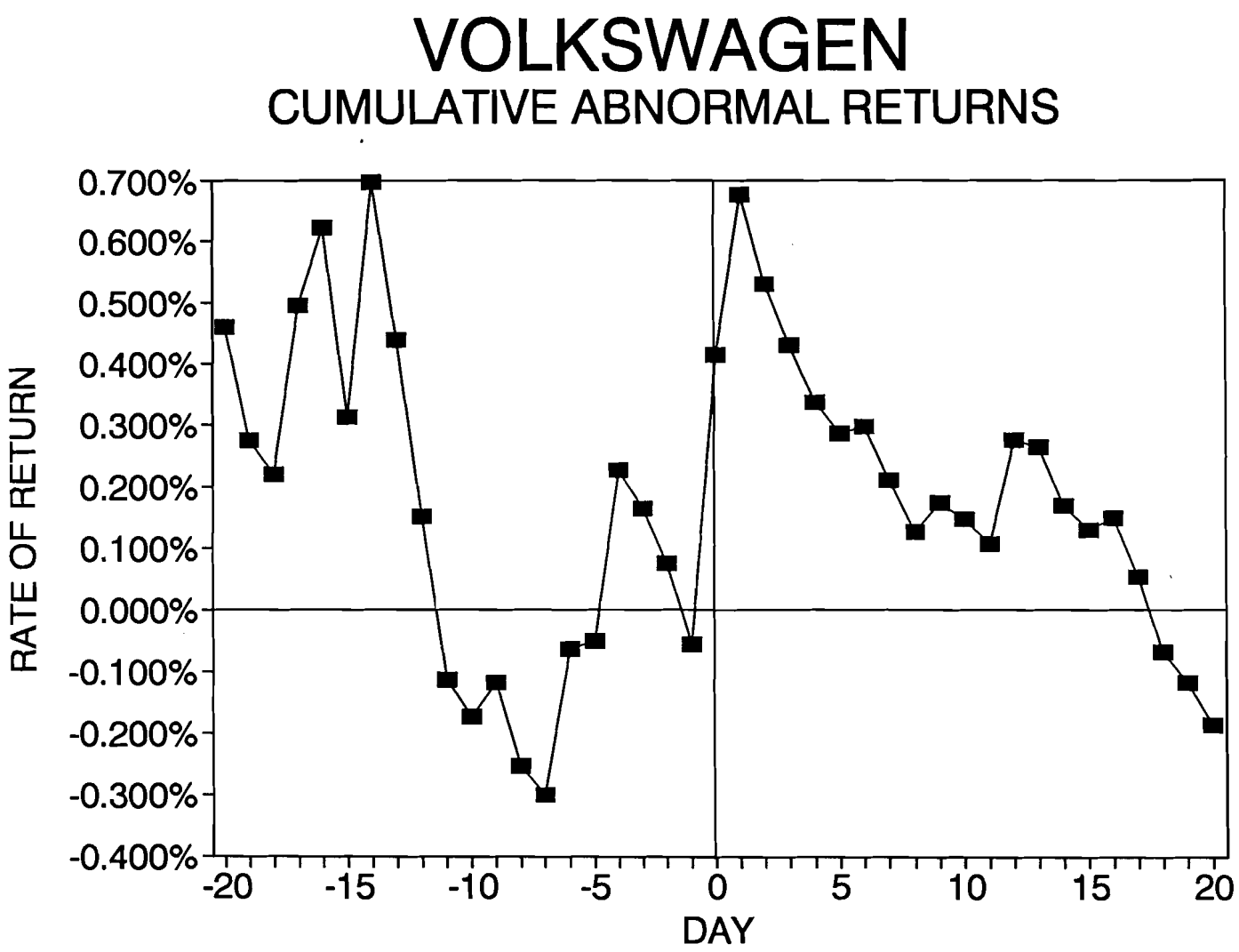
Results of Significance Testing on the Cumulative Abnormal Returns of Daimler Benz

Day	Cumulative Abnormal Return	T-Statistic
-3	.006074	.690936
-2	.005646	.642271
-1	.006447	.733342
0	.004570	.519792
1	.004542	.516717
2	.004715	.536290
1	.005019	.570921

The cumulative abnormal returns of Volkswagen are graphed in Figure 6. The movement of these abnormal returns indicate that there was a significant amount of volatility in the market prior to the East German vote. It's interesting to note that these abnormal returns of Volkswagen are the only returns in this study to actually dip below zero during my event period. This movement between higher than "normal" and lower than "normal" rates of return indicate that there was a considerable degree of uncertainty in the market in anticipation of the vote on March 18. One would also expect to see more volatility in the stock returns of Volkswagen because, as discussed earlier, the firm's stock has a beta greater than one which indicates a higher level of risk than the average stock.

The cumulative abnormal returns of Volkswagen also represent a definite market reaction to the vote on March 18, which is not seen in the returns of either BMW or Daimler Benz. The graph indicates that on March 19 (Day 0) there was a dramatic increase in the abnormal returns of Volkswagen which had been negative when the market closed on March 16 (Day -1). This positive increase was followed by another positive increase on Day 1, however, the abnormal returns begin to decline immediately thereafter. The positive increase, therefore, did not sustain itself over time as I hypothesized it would. The reaction which produced this dramatic increase in the abnormal returns of Volkswagen was undoubtedly a euphoric response or "overreaction" associated with the emotion surrounding German Reunification and the East German vote of March

Figure 6


VOLKSWAGEN
CUMULATIVE ABNORMAL RETURNS
RATE OF RETURN
0.700%
0.600%
0.500%
0.400%
0.300%
0.200%
0.100%
0.000%
-0.100%
-0.200%
-0.300%
-0.400%
-20
-15
-10
-5
0
5
10
15
20
DAY

18.

An explanation of this "overreaction" may be found in the "Overreaction Hypothesis" put forth by researchers Werner DeBondt and Richard Thaler. In their research DeBondt and Thaler argued the following:

> ...the market as a whole (and the price of individual stocks as well) systematically exaggerates the economic consequences of major events by raising prices too high when the news is good and cutting prices too sharply when the news is bad (Brown and Tinic p. 2, 1990).

The "Overreaction Hypothesis," therefore, suggests that large increases or decreases in stock prices (as seen in the returns of Volkswagen) will usually be followed by large adjustments in the opposite direction (i.e. large increases in price will be followed by decreases, and large decreases in price will be followed by increases). Although subsequent studies have argued that an "overreaction" leading to increases in stock price is actually an "underreaction" to be followed by additional increases, the reaction seen in the abnormal returns of Volkswagen seem to support the assertions of DeBondt and Thaler (Brown and Tinic 1990). The returns clearly show a large increase directly following the East German vote on March 18, and then an immediate decline in the abnormal returns to "adjust" for this "overreaction." In fact, within 18 market days after Day 0, the cumulative abnormal returns had returned to the pre-event rate of return.

The subsequent decline in these returns immediately following the emotional "overreaction" of shareholders also indicates the efficiency of the market in responding to particular events. Although there was a definite euphoric reaction after the vote on

March 18, the economic realities of the Reunification process set in to the market, and the result was an immediate decline in the abnormal returns of Volkswagen. The possibilities of high inflation rates, high unemployment, and the general economic and political uncertainty detailed earlier in this paper were reflected in the market, and therefore, offset any market opportunities Volkswagen may have established for itself in East Germany prior to March 18. In addition, shareholders may have placed a higher discount rate on the future stream of returns for Volkswagen due to the higher risk associated with the economic climate of the time. This increase in risk could indicate that Volkswagen's beta (measure of its stock's risk) may have actually been higher than the beta calculated earlier in this study. Therefore, the $3 billion investment Volkswagen made in East Germany prior to the announcement of Reunification essentially had no sustained positive effect on the stock returns of the company after the March 18 vote.

After conducting significance testing on the cumulative abnormal returns of Volkswagen over my entire event period, I once again discovered no significant results. (See Table 7). This indicates that the announcement of Reunification on March 18 had no significant effect on the stock returns of the company. Therefore, March 18 was also a non-event for Volkswagen.

The cumulative abnormal returns for the West German automobile industry as a whole are graphed in Figure 7. These industry returns eliminate the random events associated with the particular firms in this study and thus deal more specifically with the systematic or market-wide risk. The minimization of firm-specific

Table 7

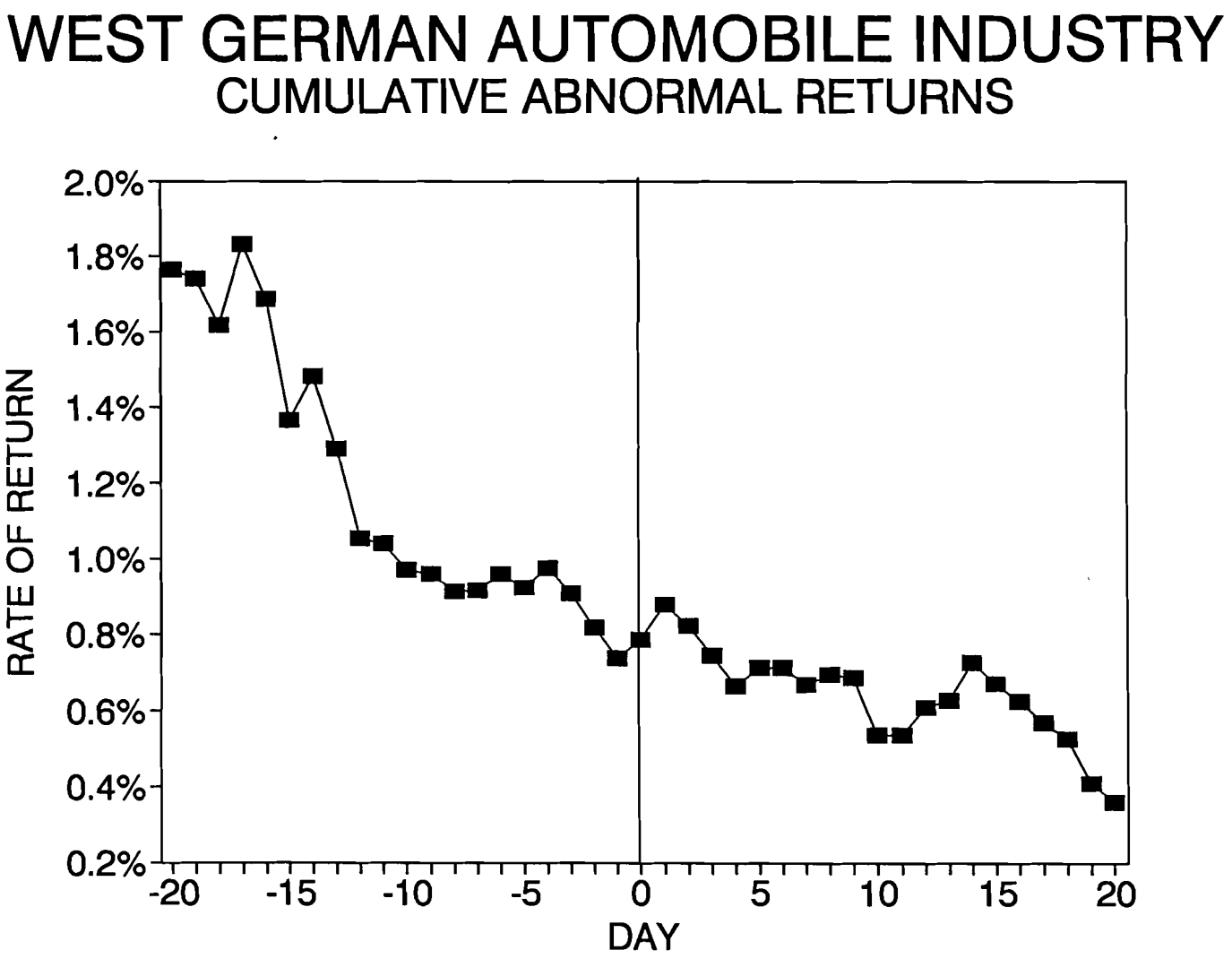
Results of Significance Testing on the Cumulative Abnormal Returns of Volkswagen

Day	Cumulative Abnormal Return	T-Statistic
-3	.001655	.163153
-2	.000753	.074284
-1	-.000560	-.055270
0	.004154	.409343
1	.006764	.666552
2	.005328	.525041
3	.004309	.424649

factors is apparent in the lack of volatility and erratic movements of the abnormal returns.

The graph actually looks quite similar to the cumulative abnormal returns of BMW (see Figure 4). Once again, there are no distinct increases or decreases in the returns of the industry which can be attributed to the announcement of Reunification on March 18. In, fact, the returns of the industry were gradually declining throughout the event period, but remained higher than "normal" indicating the market was probably responding to an event which took place prior to my event period. These consistently higher than "normal" returns for the industry are not surprising considering the higher than "normal" rates of return earned by both BMW and Daimler-Benz during the event period. Focusing specifically on my event date, however, it is clear that there were no sustained increases or decreases in the overall returns of the industry as a result of the announcement of Reunification on March 18.

Figure 7


WEST GERMAN AUTOMOBILE INDUSTRY
CUMULATIVE ABNORMAL RETURNS
RATE OF RETURN
2.0%
1.8%
1.6%
1.4%
1.2%
1.0%
0.8%
0.6%
0.4%
0.2%
-20
-15
-10
-5
0
5
10
15
20
DAY

I conducted significance testing on the cumulative abnormal returns for the industry over the entire event period. I found significant returns throughout the month of February (which again suggest the presence of an event prior to my event period), and significant returns at Day -3 and Day 1. (See Table 8). However, because these returns did not sustain themselves over time, it is a clear indication that March 18, 1990, was indeed a non-event for the German automobile industry as a whole and for the individual firms which I chose to represent the industry. The increased market opportunities and potential increase in profitability made available to the industry through Reunification with East Germany were apparently offset by the harsh economic realities of the Reunification process. Therefore, there was no significant response on behalf of the German automobile industry to the announcement of German Reunification on March 18, 1990.

Table 8

Results of Significance Testing on the Cumulative Abnormal Returns of the West German Automobile Industry

Day	Cumulative Abnormal Return	T-Statistic
-3	.009072	2.074189*
-2	.008177	1.884857
-1	.007385	1.711437
0	.007858	1.741368
1	.008785	1.904219*
2	.008222	1.799248
3	.007454	1.632431

* significant at $\alpha = .05$

Conclusions, Implications, and Suggestions for Further Research

Overall, this event study concludes that there was no significant reaction by the German automobile industry or the individual firms I selected to represent the industry - BMW, Daimler-Benz, and Volkswagen - to the announcement of Reunification on March, 18, 1990. The lack of any sustained significant reactions around this event date suggests that the market response to the announcement must have taken place earlier in the Reunification process. One could reasonably argue that the permanent market reaction took place as early as November of 1989, when world-wide speculation and anticipation of German Reunification began with the crumbling of the Berlin Wall. Therefore, an examination of the market during the few days preceding and following the breaching of the Berlin Wall might yield more significant results.

In addition, an examination of the market during those few weeks prior to my event period may also provide significant results. As discussed earlier, BMW, Daimler Benz, and the German automobile industry as a whole all experienced higher than "normal" rates of return throughout the event period suggesting the presence of an event sometime prior to February 2, 1990. Although this event may or may not have anything to do with the Reunification process, an examination of the important events occurring in January of 1990 may provide further interpretation for the tail-like response I discovered in the abnormal returns of BMW and the German automobile industry during my event period.

The nonresponse of the automobile industry suggests that

perhaps a different industry analysis might have been more appropriate for the purposes of this study. For example, electronics-related industries may have shown an increase in abnormal returns due to the immediate and continuous East German demand for such Western "luxuries" as televisions and stereo equipment. These abnormal returns may have also sustained themselves over time (unlike the returns of the automobile industry) because the future profitability of electronics firms may be viewed as more promising due to this continuous demand for technologically advanced equipment in East Germany.

Focusing now on the results of this study, although not significant, they do provide support to the theory of market efficiency. As seen most dramatically in the cumulative abnormal returns of Volkswagen, the market could not be "fooled" by the emotion surrounding the East German vote on March 18. Rational shareholders quickly re-evaluated the grim economic realities associated with the Reunification process, and this re-evaluation is seen clearly in the immediate decline of Volkswagen's abnormal returns.

This re-evaluation was apparently an informed prediction of events to come. Within months of the actual German Reunification on October 3, 1990, Germany was facing "mountainous deficits and slower growth as the burden of rebuilding the East [exceeded] the West's grimmest expectations" (Templeman p. 50, 1990). Higher inflation rates, higher unemployment rates, higher taxes, and higher budget deficits than expected have put both Germany and Chancellor Helmut Kohl in a most uncertain position. While some

businessmen such as Günther Röttgering of Hengst Filterwerke maintain that the economic turnaround in the East "will happen faster than many people expect," such optimism is in much shorter supply these days (Templeman p. 52, 1990). A current study of the market may provide a more realistic indication of shareholder faith in the future of the German economy.

In addition, because I was unable to find any significant results in this study, it is difficult to determine the role of the Germany automobile industry in the Reunification process, and perhaps more difficult to know whether German Reunification will eventually lead to increased profitability for the industry as a whole. However, there is a definite and significant demand for automobiles in East Germany, with some estimates reaching up to 700,000 units a year ("The Big Merger" 1990). This demand will undoubtedly provide a small-vehicle, low-cost, manufacturing firm such as Volkswagen with increased profitability in the long run. (Although the potential for future profitability was not apparent in the results of this study). Luxury automobile manufacturers such as Daimler-Benz and BMW, however, may not see a definite increase in profitability as a direct result of Reunification for many years to come. Every dollar of capital invested by these firms in East Germany is vital to the rebuilding of the East German economy, and it is likely that such investments will someday lead to increased profitability for the automobile industry as a whole. However, whether the industry will serve as the "engine of the East German economic recovery" is something that remains to be seen.

In conclusion, this event study also provides an example of

how event study methodology can be applied to events which fall outside the realm of firm-specific or industry-specific announcements. Considering the usual application of this methodology to such events as buy-outs and mergers, this event study reveals that the methodology can also be useful in the analysis of events having world-wide political, financial, and economic implications. This study of German Reunification therefore opens up new paths to be explored in future financial research.

Appendix

In order to conduct significance testing, the following equations were used to standardize the abnormal and cumulative abnormal returns for BMW, Daimler Benz, Volkswagen, and the German automobile industry.*

1) $$SAR_{jt} = (R_{jt} - \hat{R}_{jt})/S_{ie}$$

where SAR_{jt} = the standardized abnormal return for firm j in time period t

R_{jt} = the actual return observed for firm j in time period t

$\hat{R}_{jt}$ = the estimated return for firm j in time period t

S_{ie} = the standard error of the estimate

2) $$SAR_{Nt} = \Sigma_j \, SAR_{jt}/N^{1/2}$$

where SAR_{Nt} = the standardized abnormal return for the industry in time period t

N = 3, the number of firms in this study

3) $$SCAR_{jn} = \Sigma_t \, SAR_{jt}/n^{1/2}$$

where $SCAR_{jn}$ = the standardized cumulative abnormal return for firm j over n periods

$n^{1/2}$ = the number of periods to date

4) $$SCAR_{Nn} = \Sigma \, SCAR_{jn}/N^{1/2}$$

where $SCAR_{Nn}$ = the standardized cumulative abnormal return for the industry over n periods

N = 3, the number of firms in this study

*Equations formulated by Dr. Robert Leekley of Illinois Wesleyan University in accordance with event study methodology literature.

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