Mergers and Government Policy *

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Abstract. *It has long been thought that government antitrust policy has an effect on aggregate merger and acquisition activity, but the empirical support for this hypothesis has been weak and inconsistent. This paper uses a new empirical specification and a new dataset on mergers and acquisitions to provide support for this conjecture. Regression analysis shows that government policy has a significant influence on mergers and that the nature of the effects depends on the type of merger. Fitting the time series into a two-state Markov switching model shows that conglomerate and horizontal time series follow different dynamics for the last half century, which is most likely caused by the dissimilar treatment of the two types of merger by the government. Only the conglomerate merger and acquisition time series is well described by a two-state Markov switching model. In contrast, the horizontal time series has a break in the early 1980s that may be attributed to the dramatic change in government policy.*

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1 Introduction

It has long been thought that government antitrust policy has an effect on aggregate merger and acquisition (M&A) activity,[1] but the empirical support for this hypothesis has been weak and inconsistent. This paper uses a new empirical specification and a new dataset on mergers and acquisitions to provide support for this conjecture. It finds that government policy does have a significant influence on mergers and that the nature of the effects depends on the type of merger.

The attitude of the merger enforcement authorities (the Antitrust Division of the Department of Justice and the Federal Trade Commission) toward mergers has undergone quite a few changes over the past fifty years. These changes can be attributed to political and economic factors as well as to advances in our understanding of the economics of mergers.[2] In the early 1960s mergers were evaluated almost entirely on the basis of structural parameters: market concentration and the market shares of the merging firms. In the 1980s merger-related efficiencies were recognized by the authorities, and the cost savings associated with mergers, perceived as harmful to competition in the 1960s, were appealed to in their defense. Another important change involved the treatment of competitive effects. John Kwoka (2004) [15] states that among the three concerns with mergers (cooperative effects, unilateral effects, and strategic behavior), the cooperative effects received the most attention in the 1960s. It was the prevailing view at the time that any increase in concentration via merger would increase the probability of collusion. These strict views were later abandoned and unilateral effects, included in the 1992 Merger Guidelines, became an important part of merger analysis.

Even though it is recognized that government policy should play a role in merger and acquisition analysis, few studies control for it. This may be a result of the difficulty in defining a variable that accurately reflects changes in government policy. One frequently used indicator of antitrust policy is simply the number of mergers challenged by the FTC and/or the DOJ in a given time period. However, as Lawrence White (1998) [10] notes, this variable is "largely inappropriate" (p.327) because number of cases may just indicate the ambivalence, or lack thereof, of the government's stance.

An alternative variable for government policy is time dummies. This works well for cross-country comparisons (for more details see M. Nicholson, 2004) [17], but for the analysis of U.S. mergers the results are inconsistent.

[1] For example, see Bittlingmayer (1985) [4].

[2] There are several excellent papers, such as Baker (2003) [1] and Bittlingmayer (2002) [6], that comment on the evolution of antitrust enforcement in the US.

There is little consensus on which events should be defined by dummies. Devra Golbe and Lawrence White, in their seminal paper "A Time-Series Analysis of Mergers and Acquisitions" [8], use a set of dummies to control for changes in tax laws. One of the variables is for the year 1981 and almost coincides with the introduction of the 1982 Merger Guidelines that restructured merger analysis. The coefficient on the 1981 variable is "consistently insignificant in a number of alternative model specifications," and so White [10] concludes that changes in antitrust enforcement do not appear to be a significant cause of the 1980s merger wave. However, this result might also indicate that a set of simple dummy variables is not complex enough to capture the effects of changes in government policy. Any policy change toward mergers is not abrupt, but rather gradual, and the variable used needs to reflect this fact.

This paper uses a splined time trend variable as a proxy for changes in government policy toward mergers.[3] The time trend is splined at the issuance of new Merger Guidelines in 1968, 1982, 1984, 1992, and 1997. The Merger Guidelines spell out the rules of antitrust enforcement, so a new issue of the Guidelines is a reliable signal of changes in policy. The splined variable performs well under a variety of settings, as discussed further below.

This paper is related to the branch of research that analyzes the patterns in which mergers and acquisitions (M&A) occur. R.J. Town (1992) shows that mergers cluster in waves by fitting the M&A time-series into a two-state Markov switching-regime model[4]. This study uses a different dataset from Town's paper and confirms the wave hypothesis using a similar two-state Markov model. This paper uses the idea of Mitchell and Mulherin (1995) [16] that merger time series need to be decomposed if we are to better understand them; the decomposition used in this study is by type of merger. The effects of government policy are tested separately for horizontal and conglomerate mergers, as well as for total merger and acquisition activity. As expected, the effects of the revolutionary 1982 guidelines are consistently positive (increased M&A activity) and significant in all specifications. The 1992 and 1997 Guidelines, which clarified policy toward horizontal mergers, are insignificant in most of the settings.

This study contributes to the existing literature on the time-series analysis of mergers and acquisitions by introducing a government policy control variable that captures regulatory changes and performs well in a variety of settings. Also, this paper examines government policy effects separately for conglomerate and horizontal merger time series, something that has not been

[3]For a detailed construction see the Appendix.

[4]For an alternative characterization see Barkoulas, Baum, and Chakraborty (2001) [2]

attempted previously.

The rest of the paper is organized as follows: section 2 presents the detailed construction of the merger activity and the government policy variables; section 3 contains the regression analysis on merger and acquisition time series and explores the robustness of the government policy spline; section 4 presents the Markov switching model of merger applied to the aggregate merger time series and to horizontal and conglomerate time series separately; section 5 concludes.

2 The Data

Studies of the time series of merger and acquisition activity may provide conflicting insights. This is partially due to the fact that "one continuous and consistently assembled time-series on the number of aggregate mergers and acquisitions does not exist" (Town 1992, p. S86) [20]. Golbe and White (1987) [8] summarize the sources of data available and findings on which explanatory variables should be used in the merger regression. The key to assembling the explanatory variables is to treat a merger as an act of investment. Thus, as an investment, it should be influenced by business cycle fluctuations and changes in expectations for the future. [5] In this study the unemployment rate, stock market return, as well as the AAA bond rate are used to control for the business cycle and future expectations effects. Changes in the stock market return not only signal changes in expectations but also are indicative of firms' ability to finance acquisitions. A merger is a purchase and thus is a function of the availability of financing. Financing can be done through internal funds or by borrowing. The AAA bond rate is a typical indicator of firms' ability to borrow. On the one hand, higher bond rates will make financing more costly and decrease incentives to merge. On the other hand, higher bond rates mean higher inflation, and, holding depreciation rules constant, higher inflation drives a wedge between the value of new and used capital, stimulating investment.

The most important and controversial variables in any merger analysis are indicators of merger activity and government policy, the construction of which is described below.

[5] M.Gort (1969) [9] hypothesizes that mergers are triggered by shocks that increase deviations in future expectations.

2.1 Merger Activity Variable

To analyze the effects of merger policy, a continuous time series spanning much of the last half century is necessary. This is the time period over which U.S. merger policy has evolved.

The 40-year time series for this study is created by merging two disjoint datasets. The merger data are obtained from (1) the Larger Merger Series (assets of $10 million or more) published by the Federal Trade Commission (FTC) for mergers announced between 1949 and 1980 and (2) the Securities Data Corporation (SDC) series for mergers announced between 1980 and 2004. The SDC dataset is not censored while the FTC dataset includes only the transactions of target companies who are in mining or manufacturing and have assets of over 10 million dollars in nominal terms. The transaction value and assets of the target company are available in both datasets.

There are three choices for the merger and acquisition activity variable, all consistent with the literature: (1) number of mergers; (2) aggregate assets of the target companies; and (3) aggregate transaction values.

Using the number of mergers is problematic largely because the data are censored to exclude mergers between "small" firms, which are the greatest in number. To clarify this, think of a distribution of firms by assets, ordered from smallest to largest. This distribution is censored from the "smallest" end: the distribution tail with assets less than a certain amount is cut off. Now, if we simply count the number of the remaining firms, the result crucially depends on the cut-off point, because mergers between companies with small assets are the largest in number. In the FTC data the cut-off points are in nominal terms, which means they are different from one year to the other. Even homogenizing the cut-off points leaves some degree of error that affects the number of firms. Also, the distribution of mergers by assets may change over time. If the distribution changes, then again the number of observations remaining after censoring is affected. As the simple number of mergers in a censored dataset increases, it can be attributed to the fact that there has been a shift in the distribution of assets. Aggregate transaction values or aggregate assets are not as sensitive to censoring: the assets that are censored out represent only a small fraction of the total sum, and changes in the censoring point would not make a significant impact on the aggregate value of the remaining observations.

The choice in favor of aggregate transaction values (3) is dictated by data availability and by changes in corporate finance structure that make the choice of aggregate assets (2) not feasible. Transaction value is a more practical alternative. Even though the FTC does not track transaction val-

ues well, especially in early years, the SDC tracks transaction values more consistently than the value of assets. Due to changes in the level of corporate debt the use of aggregate assets of the target company would be inconsistent through time. As corporate debt grew through the 1980s and 90s, net assets (that is, assets minus liabilities) of some companies became negative, while total assets remained relatively large. Thus, transaction value signals the true market value of the target company, making it a reliable measure of merger activity for this study.

To place the two datasets (FTC and SDC data) in the same format, the data need to be censored. The resulting dataset is for mergers announced between 1962 [6] and 2004 and contains mergers for which the target company is in mining or manufacturing and has over 10 million in assets in 1962 dollars.[7] When missing, transaction values are imputed.[8]

Transaction values are summarized by quarter and divided by the total market value of all firms in mining and manufacturing.[9] This normalization removes movements in aggregate transaction values that are due to an overall increase in market value.[10] Note that the merger activity variable is the percent of the total market value of firms in mining and manufacturing that were acquired through merger in a given quarter. This variable is plotted in Figure 1.

Four-digit SIC codes are available for both target and acquiring companies. Using SIC codes, all mergers can be divided into horizontal (all 4 digits identical for the merging parties) and conglomerate (either zero digits

[6]Data before 1962 do not allow for imputations.

[7]The assets and transaction values were normalized using the CPI. Step one: in the FTC dataset, all transactions where the target company assets were less than 10 million in 1962 dollars were deleted (only about 3%). SDC was not trivial to censor, because the assets are not available in many cases or not indicative of the true value of the transactions. Step 2: The 10 year (1970 - 1979) average of the minimal transaction value in the censored FTC data (step 1) was chosen to be the censoring point for the SDC data.

[8]Imputations were done using OLS regressions, where transaction values were independent and assets of the target company were explanatory variables. Regressions were run for every two years separately to allow for changes in the relationships. Imputations were done on the individual firm levels and then transaction values were aggregated by quarter. We do not expect any consistent bias in the imputation, thus the aggregation should eliminate the individual errors.

[9]Market value of a company was constructed using COMPUSTAT quarterly data, and is defined as (average price)*(number of shares outstanding) + (book value of total assets) - (book value of common equity).

[10]An accidental feature of the merger activity variable is that an event that has the effect of increasing the total market value in mining and manufacturing, but not the transaction values of the merging parties would appear to show a decline in merger activity.

or only the first digit is the same)[11]. The rest of the mergers cannot be successfully classified and are labeled "other". Horizontal, conglomerate and other merger series are plotted in Figures 2 through 4.

2.2 Construction of the Government Policy Variable

Previous studies have commonly used the number of mergers that were challenged by the government as a measure of antitrust enforcement. For example, Jovanovic and Rousseau (2001) [13] provide an interesting illustration of the antitrust stance on merger activity. They plot the number of cases brought by DOJ normalized by GDP and merger capitalization as a percentage of GDP to show the inverse relationship between the two, but they present no regression analysis. Examining the relationship between investment and politics, Bittlingmayer (2001) [5] uses antitrust case filings as a measure of regulatory uncertainty. Ghosal (2004) [7] analyzes U.S. merger enforcement defined as the number of cases brought by the government. He finds a downward regime shift in merger enforcement around 1974 and attributes it to, among other factors, a greater emphasis on efficiency. Ghosal (2004) also mentions studies that consider the political make-up of Congress, Supreme Court nominations (by party), and the party of the president as possible government policy variables. He concludes that no strong relationship was found.

To summarize, the variable most often used to control for changes in government attitudes toward mergers is the number of cases brought by the DOJ or FTC. However, a change in the number of challenged mergers may in fact reflect a few things: (1) a change in policy, and/or (2)the government's greater or lesser success in transmitting its stance on mergers to the private sector, and/or (3) an increase or decrease in attempts to merge. Thus, the number of mergers challenged by the government is not suitable for the purposes of this study.

The choice of the government policy variable in this paper comes from a close examination of antitrust enforcement history. In United States it dates back to the Sherman Act (1890), which focuses on restraints of trade and monopolization, the latter being a common form of business structure at the time. Mergers first received formal attention 24 years later in section

[11]The four digit SIC codes do not take into account geographical location, and are not always good approximations for antitrust markets. See Pittman and Werden(1990)for further discussion [18]. However, the breakdown in this paper performs relatively well on the aggregate level. For more detail see Appendix.

7 of the Clayton Act (amended substantively in 1950 by the Celler-Kefauver Act). Under section 7, a merger is prohibited whenever its effects would "substantially lessen competition." The correct interpretation of this phrase has been the subject of debate ever since. On one side there is the "structural" approach, such as the Brown Shoe case, that prevents even a small increase in concentration. Under this approach, when assessing the effects of mergers, only parameters such as market shares of the merging firms are taken into consideration. On the other side of the spectrum are those who think that competition implies the freedom to exploit efficiencies, and so if a firm has a large market share it is the result of its superior performance.

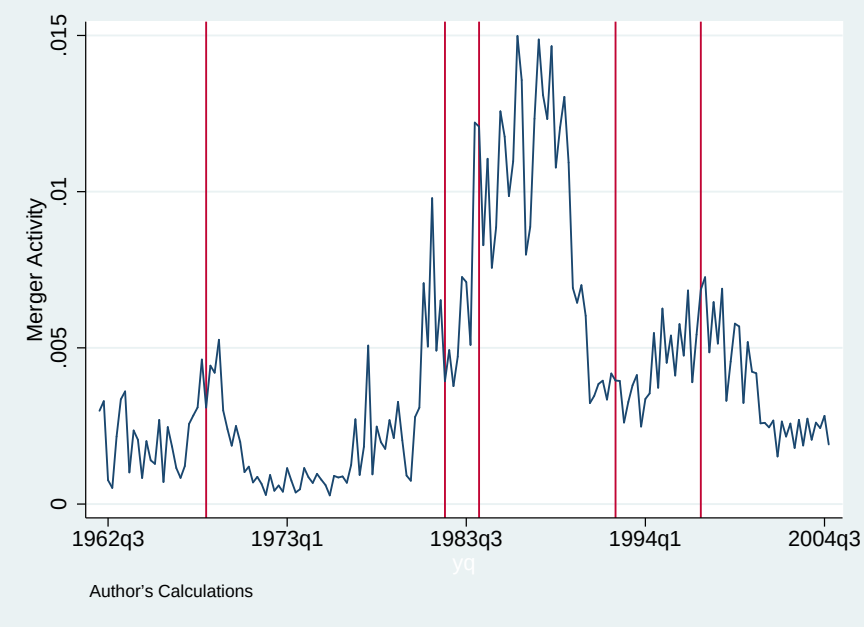
Structural merger policy has roots in the late 1940s, but was not well established until the early 1960s. The government stance on mergers was not well understood by the business sector; to clarify it, the Department of Justice issued the first Merger Guidelines in 1968. [12] The Guidelines said that efficiencies would be considered, but only in extraordinary cases. The standards were set with a heavy emphasis on the structure of markets and "reflected a widely-held view that by reducing the number of firms, a merger increases the probability that the remaining firms could price in a noncompetitive manner"(J. Kwoka (2004). [15] There was no precise market definition in the Guidelines, and the intention was to preclude the elimination by merger of any large firm.

When Ronald Reagan came to power in 1980, he appointed William Baxter as the head of the DOJ's antitrust division; this gave antitrust policy a new direction. The "Baxter" Guidelines were issued in 1982 and signaled a change in attitude toward mergers, especially horizontal mergers. An attempt to merge horizontally was treated with less suspicion, acknowledging that there can be legitimate reasons for mergers between close competitors. In the 1982 Merger Guidelines, the market was well defined and a new measure of market concentration, the Herfindahl-Hirshman index (HHI), was introduced. Efficiencies were considered in setting what were viewed as high market-share thresholds, but the government was still disinclined to consider efficiencies in individual cases.

In the 1984 Guidelines the role of efficiencies was elaborated further, giving "appropriate weight to efficiencies in all relevant cases." The 1984 Guidelines did not change the main message of earlier Guidelines, but clarified previously vague statements. Note that issuance of the 1984 Guidelines coincided with Baxter leaving the Antitrust Division.

[12]Papers such as Willig, Salop, and Scherer (1991) [21], Kolasky and Dick (2003) [14], and Scheffman, Coate, and Silvia (2002) [19] provide an excellent examination of the evolution of the Merger Guidelines.

Figure 1: Total Merger Activity



Merger Activity is the percent of the total market value of firms in mining and manufacturing acquired through merger

The next edition of the Guidelines was in 1992, and since then the Guidelines have become the "Horizontal Merger Guidelines." Decision-making shifted from structural presumptions based on market shares and concentration ratios toward qualitative competitive effects analysis. "Unilateral effects" were introduced to supplement the "coordinated effects" that had been the heart of the 1982 Guidelines. There were no major changes in the section on efficiencies; however the "clear and convincing evidence" standard was eliminated, which signaled a greater openness to considering efficiency arguments.

The most recent revision occurred in 1997 when only the section on efficiencies was changed. The government defined the term "efficiencies" and described how to demonstrate their presence. Most commentators interpreted the revisions as adopting a "consumer welfare" approach, which considers efficiencies only to the extent that they are likely to be passed on to consumers in the form of lower prices and enlarged output.

The government stance on mergers has been changing for the last half century. The Merger Guidelines communicate the government's stance on mergers to the business sector and new editions of the Guidelines reflect changes in policy.

Figure 2: Conglomerate Merger Activity

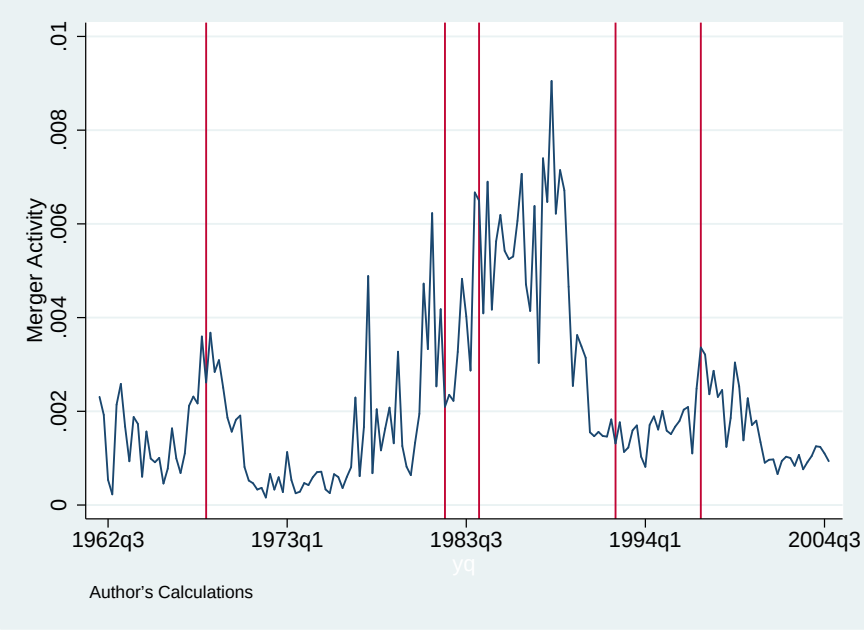


Figure 3: Horizontal Merger Activity

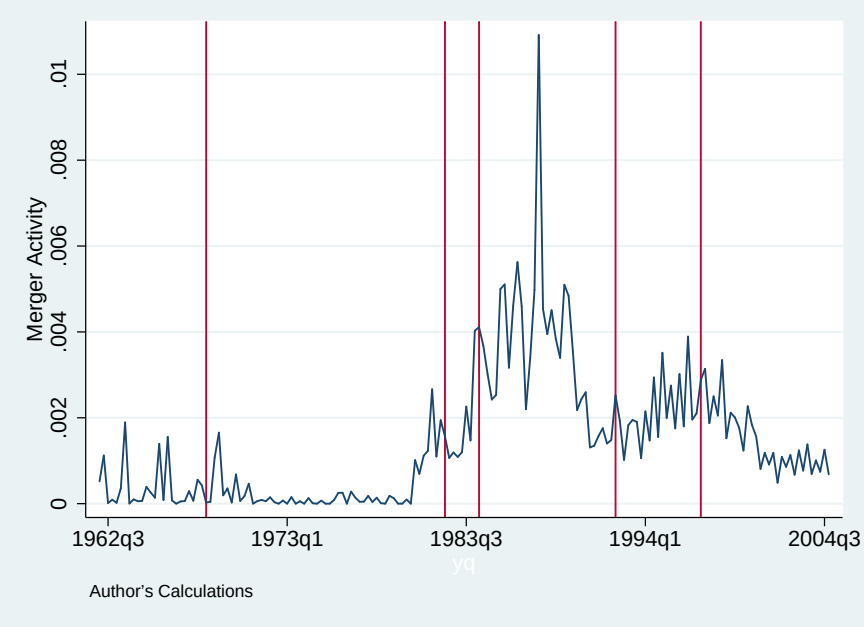
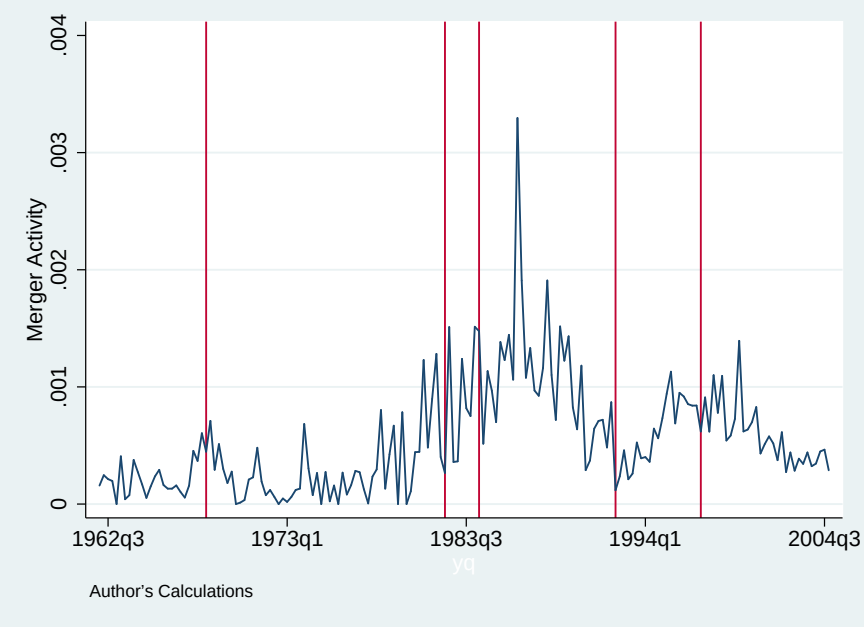


Figure 4: Other Merger Activity



Because there is no available continuous variable to control reliably for changes in government attitudes, and therefore the next best alternative is to find a set of events that signal the changes in government policy toward mergers and to use a set of time dummies to control for them. The issue dates of the new Merger Guidelines are the best option (at least for the data available: 1962-2004). Figure 1 plots the aggregate merger activity variable used in this study. The vertical lines emphasize the dates of each new Guidelines edition. Just from looking at the graph, it can be inferred that changes in the Guidelines may play an important role in aggregate merger activity.

This impression is reinforced by the graphs in Figures 2 through 4, which plot merger activity by type of merger. The volume of horizontal mergers increases dramatically around 1982 and declines after 1997, prior to the 2000 stock market crash.

The changes brought about by revisions to the Guidelines cannot be reflected by a simple binary (zero-one) variable. The changes are not abrupt and discontinuous, but rather represent a diffusion of new attitudes. This study proposes to use a time-trend splined at 1968, 1982, 1984, 1992, and 1997 (dates of issuance of new Guidelines) [13] to capture changes in govern-

[13]Years of new Presidential administrations (1969, 1977, 1981, 1989, 1993, 2001) was used as an alternative set of dates for the spline. This specification did not perform well: all the spline coefficients turned out to be not statistically significant.

ment policy.[14] The robustness of the results is checked in a variety of settings.

3 Empirical Analysis

This section presents the regression analysis of the merger and acquisition time series both for aggregate merger and, separately, for conglomerate and horizontal merger time series. The regression analysis is presented in the following way: section 3.1 explains the setup of the basic instrumental variable regressions; section 3.2 analyzes the differences and similarities in the horizontal and conglomerate time series; section 3.3 illustrates the impact of government policy using graphical analysis; section 3.4 checks the robustness of the government policy spline; and section 3.5 tests whether the government policy regimes affect the relationship between merger activity and current market conditions.

3.1 Instrumental Variables Regression

Following the literature, merger and acquisition activity is modeled as a function of current market conditions, government policy, and a firm's propensity to merge. That is, the linear relationship is:

$$y_t = \alpha + \gamma G_t + \beta x_t + \varepsilon_t \tag{1}$$

where y_t is merger activity at time t, G_t is a measure of government policy, x_t represents current market conditions, and ε_t is an innovation. The government policy variable is the splined trend. Current market condition variables are measured by moving averages of the AAA bond rate, unemployment rate, and stock market return.

Current market conditions (x_t) are correlated with innovation in the propensity to merge (ε_t). To correct the endogeneity problem, the current market condition variables are instrumented with their own fourth and fifth lags.

The IV regressions are run for total mergers,[15] then separately for horizontal and conglomerate mergers. Standard errors are corrected for het-

[14] See the Appendix for technical details.

[15] Total Merger Activity is the percentage of the market value of all firms in mining and manufacturing acquired through merger in a given quarter.

Table 1: Estimation results : IV Regressions, 1962:1 - 2004:4

	Total Merger		**Horizontal Merger**		**Conglomerate Merger**	
	Coeff.	SE	Coeff.	SE	Coeff.	SE
AAA Bond Rate	0.054	(0.036)	0.005	(0.020)	0.039	(0.020)
Stock Market Return	0.065	(0.062)	0.033	(0.036)	0.023	(0.032)
Unemployment Rate	-0.109	(0.049)	-0.039	(0.024)	-0.058	(0.026)
Base year 1962	-0.059	(0.022)	-0.019	(0.009)	-0.034	(0.014)
1968	0.018	(0.024)	0.012	(0.014)	0.005	(0.012)
1982	0.435	(0.078)	0.175	(0.033)	0.214	(0.038)
1984	-0.086	(0.026)	-0.030	(0.013)	-0.048	(0.014)
1992	-0.021	(0.040)	-0.012	(0.020)	-0.012	(0.021)
1997	-0.016	(0.023)	-0.013	(0.010)	0.000	(0.014)
Intercept	0.664	(0.312)	0.259	(0.181)	0.352	(0.139)
N		172		172		172
R^2		0.718		0.59		0.66
$F_{(9,162)}$		24.089		32.23		14.152
Anderson canon. corr. [a]	9.117		9.117		9.117	
	$\chi^2(4)$ P-val = 0.052		$\chi^2(4)$ P-val = 0.0582		$\chi^2(4)$ P-val = 0.0582	
Hansen J statistic	2.815		2.203		3.140	
	$\chi^2(3)$ P-val = 0.4210		$\chi^2(3)$ P-val = 0.5313		$\chi^2(3)$ P-val = 0.3706	

[a] Anderson canonical correlations is a likelihood-ratio test of whether the equation is identified, i.e., that the excluded instruments are relevant, and rejection of the null indicates that the model is identified. For further discussion see Baum (2006) [3]

eroskedasticity and autocorrelation. The results are presented in Table 1. Results for the total merger regression are discussed in this section; differences and similarities between the horizontal and conglomerate mergers regressions are discussed in section 3.2.

The second and third columns report results of the IV regression for total merger activity. By construction of the spline, the effect of the base year, 1962, does not disappear when 1968 Guidelines are introduced. According to the results in Table 1, government policy had an increasingly negative impact on merger activity from 1962 until 1968. The 1968 Guidelines had a stabilizing effect: the coefficient on 1968 Guidelines is small and not statistically significant, which, by construction of the spline, means that the government policy effect becomes constant. The year 1982 has a significant positive effect on merger activity. The effect of the 1982 Guidelines does not disappear in 1984 but is gradually toned down. In 1992 merger policy stabilizes and 1997 changes in the Guidelines are felt only slightly, mostly in horizontal merger activity.

The signs of the coefficients on the government policy variable are as expected: year 1982 is strongly significant and positive, while the base year of 1962 is negative.

The year 1962 was the year of the Brown Shoe case, which was about protecting small business by preventing even small increases in concentration. The coefficient on the base year is negative and significant in all three regressions, as anticipated.

The strong positive significance of the 1982 Merger Guidelines is consistent with expectations as well. The 1982 (or "Baxter") Guidelines changed the approach to core issues in antitrust analysis - market definition - and signaled a greater openness to the idea of efficiency gains through horizontal merger.

To illustrate the significance of the 1982 coefficients, consider the summary statistics in Table 2. The overall mean of the total merger series is 0.419%, [16] while the mean value before 1982 is 0.203% and the mean after 1982 is 0.606%. The coefficient 0.4352 on the 1982 Guidelines means that the percentage of the total market value of firms in manufacturing and mining acquired through merger increased by 0.4352 percentage points per year for the years 1982 - 1984, while the 1982 Guidelines were in force. After the issuance of the 1984 Guidelines, the effect of 1982 did not disappear[17] and it causes a positive shift in the mean of the series.

[16] It is the percentage of total market value of the firms in mining and manufacturing that was acquired through merger

[17] See Table 9 in the Appendix.

Table 2: Summary statistics

Variable	Mean	Std. Dev.	Min.	Max.	N
1962-2004					
Total	0.419	0.351	0.028	1.498	172
Conglomerate	0.221	0.183	0.016	0.905	172
Horizontal	0.143	0.158	0	1.091	172
1962-1981					
Total	0.203	0.166	0.028	0.979	80
Conglomerate	0.146	0.118	0.016	0.623	80
Horizontal	0.031	0.051	0	0.267	80
1982-2004					
Total	0.606	0.361	0.152	1.498	92
Conglomerate	0.288	0.202	0.066	0.905	92
Horizontal	0.239	0.155	0.049	1.091	92

The year 1984 variable has a significant negative effect. In the context of the government policy spline it means that the 1984 Guidelines toned down the effects of the 1982 edition, rather that replacing them. Although the 1984 Guidelines did not offer many changes, they coincided with Baxter leaving the DOJ, and may have signaled a shift in attitudes toward mergers. The magnitude of the impact of the 1984 Guidelines is smaller by a power of 10 than that of 1982. The coefficients on years 1968, 1992, and 1997 are relatively small and not statistically significant.

Within the current market conditions category, only the unemployment rate, which is used as a proxy for business cycle fluctuations, has a coefficient that is statistically significant. The unemployment rate has a negative coefficient, which is expected if merger is viewed as a form of investment. As with any investment, merger activity increases as the economy is expanding and decreases during recessions.

The coefficient on the AAA bond rate is not statistically significant for the total merger regression.

3.2 Horizontal and Conglomerate Merger Time Series: Differences and Similarities

At the first glance, the results in Table 1 indicate that the coefficients on

the explanatory variables have the same sign and similar significance levels for all three regressions. This sections looks at the differences and similarities in the effects of the explanatory variables on the Horizontal and Conglomerate time series.

The most noticeable difference between the regression results in Table

Table 3: Horizontal and Conglomerate stacked, 1962:1 - 2004:4

Variable	**Coefficient**	**(Std. Err.)**
AAA Bond Rate	0.022	(0.014)
Stock Market Return	0.028	(0.024)
Unemployment Rate	-0.049	(0.018)
Base year 1962	-0.026	(0.008)
1968	0.008	(0.009)
year82 Horizontal	0.168	(0.034)
year82 Conglomerate	0.222	(0.032)
year84 Horizontal	-0.024	(0.012)
year84 Conglomerate	-0.054	(0.009)
1992	-0.012	(0.015)
1997	-0.007	(0.009)
Constant Horizontal	0.248	(0.117)
Constant Conglomerate	0.364	(0.111)
N	344	
R^2	0.834	
$F_{(14,157)}$	85.872	
Anderson canon. corr.	18.233	
	$\chi^2(4)$ P-val = 0.0011	
Hansen J statistic	4.669	
	$\chi^2(3)$ P-val = 0.1977	

1 is that the AAA bond rate is significant only in the conglomerate merger regression. The bond rates have two possible effects on mergers. On the one hand, issuing bonds can facilitate financing a merger, and thus higher bond rates should have a negative effect on mergers. On the other hand, higher bond rates often mean higher inflation. Keeping the depreciation rules constant, higher inflation drives a wedge between the value of new and used capital, stimulating investment. A significant positive coefficient on bond rates implies that conglomerate mergers are motivated by tax laws and investment opportunities more often than are horizontal mergers.

Both the government policy spline and the stock market return have the same sign for horizontal and conglomerate mergers, while the magnitudes

seem to differ. The natural question is whether the coefficients on the explanatory variables in the conglomerate and horizontal merger regressions are in fact statistically different. Using Wald-type tests, it is established that the only significantly different coefficients for the horizontal and conglomerate mergers are the two constants and the coefficients on the 1982 and 1984 Guidelines. The coefficients on the market condition variables, as well as those for the 1962, 1968, 1992 and 1997 Guidelines in horizontal and conglomerate IV regressions are statistically indistinguishable.

Table 3 shows the results of the IV regression, where the horizontal and conglomerate mergers are stacked forcing the coefficients on every variable (but the constant, 1982 and 1984 Guidelines) to be the same.

A smaller constant term for horizontal mergers is only natural because there are fewer opportunities to merge horizontally within a given industry. The 1982 coefficient is significant and positive for both regressions, and is larger for the conglomerate mergers. The 1984 coefficient is also significant and negative for both types of merger and is twice as large in absolute value for the conglomerate. That is, there was more of a"splash" in conglomerate merger and acquisition activity between the issuance of the two guidelines.

3.3 Evaluating the Impact of the Guidelines

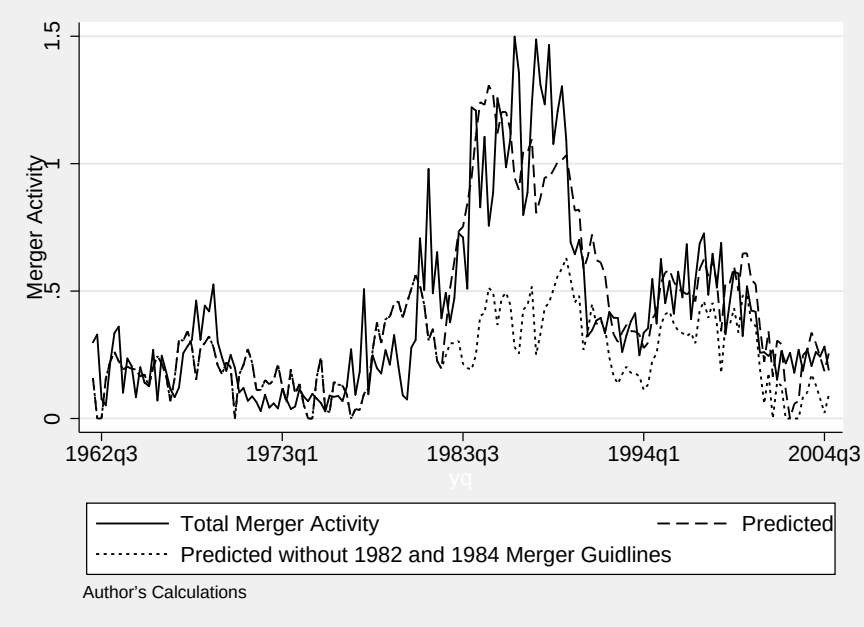
Results in Table 1 indicate that the 1982 and 1984 Guidelines have a significant impact on merger activity. This section evaluates how much of a difference government policy makes.

Figures 5 through 7 illustrate the significance of the 1982 and 1984 Merger Guidelines. Figure 5 plots 3 lines: the first one is total merger activity; the second is the prediction of total merger activity generated by using the basic IV regression (reported in Table 1); the third line is the prediction of total merger activity without the 1982 and 1984 dummies.[18] The analysis makes the strong assumption that the 1982 and 1984 variables track only the effects of government policy and are not collinear with other explanatory variables. Therefore, the results in Figures 5 through 7 should be viewed with caution.

The approximate estimated dollar impact of the absence of the 1982 and 1984 Merger Guidelines for total merger activity is a decrease in the volume of merger activity by approximately 8,350 millions of 1982 dollars per quarter.

[18]It is not reasonable to investigate the effects of 1982 Merger Guidelines alone in this setting, because the 1984 variable is moderating the effects of the 1982 Guidelines.

Figure 5: Effects of 1982 and 1984 Merger Guidelines on Total Merger



Merger Activity is the percent of the total market value of firms in mining and manufacturing acquired through merger

Figure 6: Effects of 1982 and 1984 Merger Guidelines on Horizontal Merger

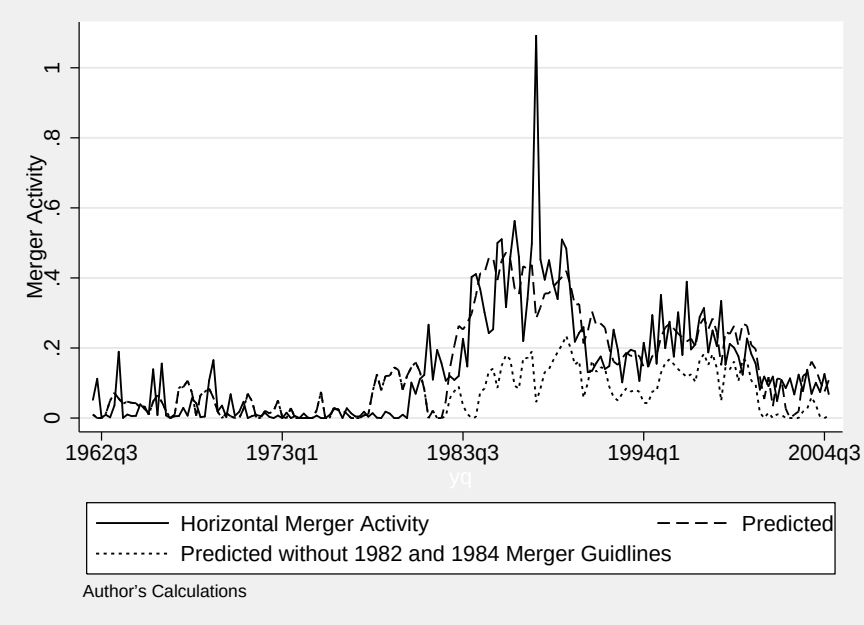
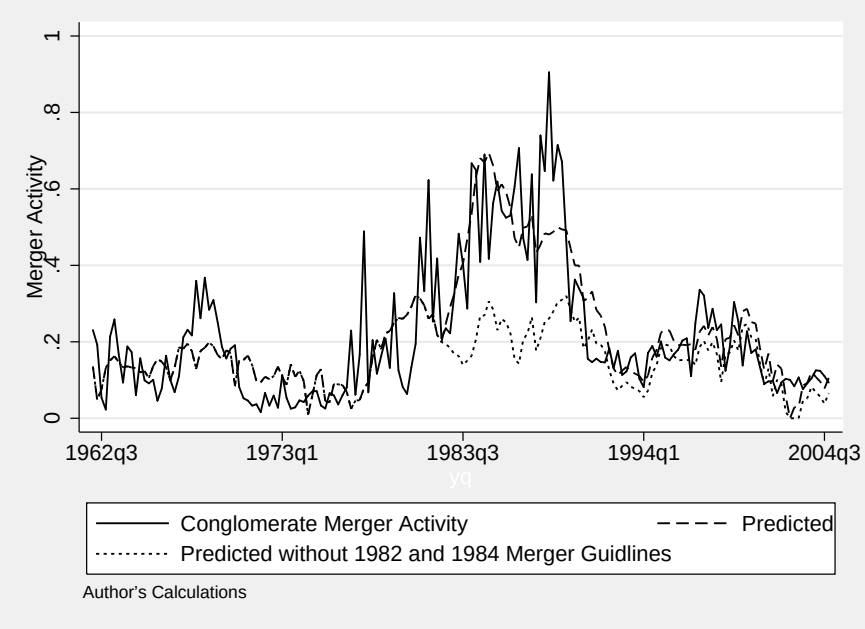


Figure 7: Effects of 1982 and 1984 Merger Guidelines on Conglomerate Merger



The predicted values of total merger activity follow the actual values fairly closely (the dashed line in Figure 5). Once the 1982 and 1984 dummies are removed, the big merger wave of the 1980s greatly diminishes in size (the dotted line in Figure 5). Keeping the total market value of firms in mining and manufacturing constant, the percentage of it acquired through merger is dramatically decreased in the 1980s when the 1982 and 1984 variables are taken out. Thus, one may conjecture that even if government policy does not cause merger waves, it amplifies them.

Figure 6 exhibits the same analysis for the horizontal merger series. The effects of the removing the 1982 and 1984 Guidelines are clearly seen to reduce horizontal merger activity in both the 1980s and the 1990s.

Figure 7 plots results for the conglomerate merger series. Absence of the 1982 and 1984 dummies significantly reduces the 1980s wave for conglomerate mergers, just as it does for horizontal. Interestingly, unlike horizontal mergers, the predicted size of the 1990s wave of conglomerate mergers is almost unaffected by the removal of the 1982 and 1984 dummies.

The coefficients on the 1992 and 1997 Guidelines are small and not significant, that is, the conventional zero-effect hypothesis cannot be rejected. For this reason a similar graphical analysis of the effects of the last two modifications of the Guidelines is not appropriate. However, there are still subtle and

not immediately evident effects of the 1992 Guidelines. By construction of the spline, the effects of the 1984 changes became a constant when the 1992 Guidelines were incorporated. One can conjecture that the 1992 Guidelines stabilized the government policy, however the proof of this statement is beyond the scope of this paper.

3.4 Robustness Checks

One possible critique of the government policy spline is that it might also pick up influences of financial innovations, such as the introduction of junk bonds as a financial tool. Figure 8 plots the percentage of high-yield bonds versus total new issuances; the vertical lines reflect the editions of the various Guidelines.[19] Financing mergers with high-yield bonds must have increased the volume of mergers. However, if not for the Merger Guidelines of 1982, it is doubtful that these mergers would have been possible in the first place. It is possible that greater tolerance toward mergers made the new financial tool so popular. It also is possible that junk bonds were an endogenous response to the increase in merger activity and therefore the need for more financing. Examining the causal relationship between high yield bond issuance and an increased number of mergers is beyond the scope of this study, and, therefore, the results in Table 4 (to be discussed immediately below) should be viewed with caution.

To check the robustness of the results, junk bonds as the percentage of total new bond issuance is entered into the IV regressions [20]. Results are reported in Table 4. New issues of high-yield bonds have a strong positive statistical significance in all three regressions. However, both 1982 and 1984 variables are still significant and have the same signs as in the first set of regressions, only the coefficient on 1984 variable in the horizontal merger regression looses significance. Although there is a potential causal relationship between the issue of guidelines and issue of high-yield bonds, the results in Table 4 still suggest that government policy has a strong statistically significant effect.

Another natural robustness check of the government policy spline is to use a set of simple binary dummies together with it, or, perhaps, instead of it. Table 5 includes results of the IV regressions with a set of government policy dummies included. (For example, the 1982 dummy has a value of one

[19]The variable High Yield Bond is available only from the second quarter of 1970.

[20]The issuance of high yield bonds is correlated with the innovations in the propensity to merge; is it instrumented with own lag and binary dummies for 1982 and 1984

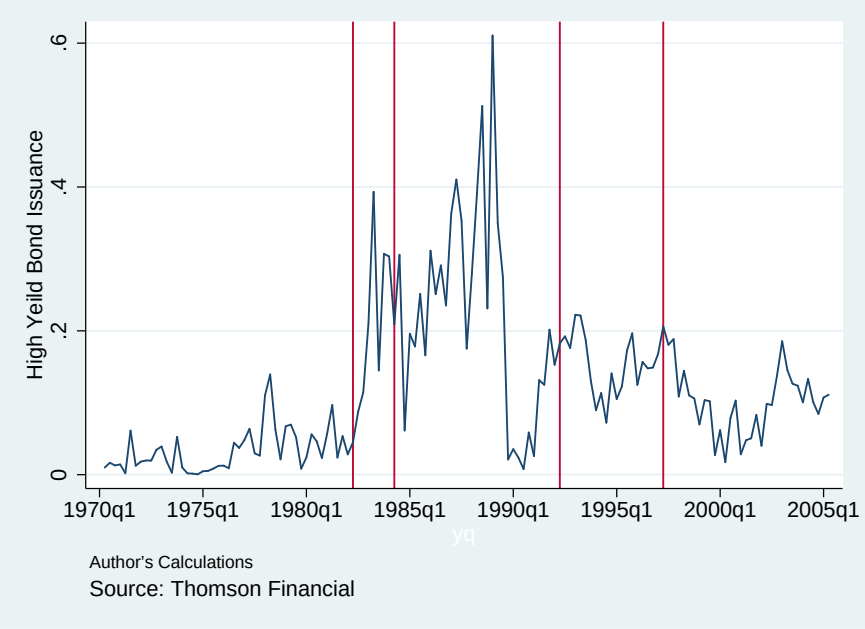
Table 4: Estimation results (2): IV Regressions with New Issuance of High Yield Bonds, 1970:2 - 2004:4

	Total Merger		**Horizontal Merger**		**Conglomerate Merger**	
	Coeff.	SE	Coeff.	SE	Coeff.	SE
AAA Bond Rate	0.076	(0.033)	0.019	(0.019)	0.045	(0.019)
Stock Market Return	0.068	(0.034)	0.034	(0.020)	0.023	(0.016)
Unemployment Rate	-0.112	(0.036)	-0.044	(0.019)	-0.055	(0.018)
Issuance of High Yield Bonds	0.015	(0.005)	0.007	(0.004)	0.007	(0.003)
1968	0.012	(0.023)	0.003	(0.017)	0.009	(0.012)
1982	0.232	(0.088)	0.091	(0.050)	0.113	(0.037)
1984	-0.045	(0.026)	-0.009	(0.013)	-0.031	(0.013)
1992	-0.018	(0.023)	-0.010	(0.012)	-0.010	(0.012)
1997	-0.001	(0.017)	-0.005	(0.010)	0.005	(0.010)
Intercept	0.022	(0.250)	0.064	(0.151)	-0.034	(0.102)
N		134		134		134
R^2		0.747		0.587		0.739
$F_{(9,124)}$		44.12		31.88		51.93
Anderson canon. corr.	15.689		15.689		15.689	
	$\chi^2(6)$ P-val = 0.0155		$\chi^2(6)$ P-val = 0.0155		$\chi^2(6)$ P-val = 0.0155	
Hansen J statistic	4.149		3.265		4.893	
	$\chi^2(5)$ P-val = 0.5281		$\chi^2(5)$ P-val = 0.6593		$\chi^2(5)$ P-val = 0.4290	

Table 5: Estimation results (2): IV Regressions with 0-1 Dummies, 1962:1 - 2004:4

	Total Merger		**Horizontal Merger**		**Conglomerate Merger**	
	Coeff.	SE	Coeff.	SE	Coeff.	SE
AAA Bond Rate	0.061	(0.036)	0.010	(0.015)	0.042	(0.024)
Stock Market Return	0.087	(0.095)	0.037	(0.049)	0.040	(0.049)
Unemployment Rate	-0.116	(0.092)	-0.037	(0.044)	-0.065	(0.048)
Base year 1962	-0.068	(0.054)	-0.027	(0.023)	-0.034	(0.032)
1968	0.016	(0.027)	0.008	(0.014)	0.006	(0.014)
1982	0.512	(0.139)	0.214	(0.076)	0.259	(0.065)
1984	-0.085	(0.037)	-0.031	(0.016)	-0.047	(0.018)
1992	-0.023	(0.077)	-0.006	(0.039)	-0.022	(0.039)
1997	-0.002	(0.043)	-0.007	(0.019)	0.006	(0.025)
dummy 68	0.028	(0.198)	0.045	(0.101)	-0.018	(0.105)
dummy 82	-0.138	(0.146)	-0.085	(0.064)	-0.069	(0.087)
dummy 84	-0.028	(0.341)	0.023	(0.167)	-0.044	(0.147)
dummy 92	0.028	(0.205)	0.007	(0.096)	0.028	(0.106)
dummy 97	-0.056	(0.063)	-0.045	(0.026)	0.000	(0.039)
Intercept	0.677	(0.594)	0.250	(0.310)	0.363	(0.275)
N		172		172		172
R^2		0.674		0.576		0.622
$F_{(14,157)}$		28.049		39.518		32.409
Anderson canon. corr.	7.636		7.636		7.636	
	$\chi^2(4)$ P-val = 0.1059		$\chi^2(4)$ P-val = 0.1059		$\chi^2(4)$ P-val = 0.1059	
Hansen J statistic	2.806		2.271		3.024	
	$\chi^2(3)$ P-val = 0.4225		$\chi^2(3)$ P-val = 0.5181		$\chi^2(3)$ P-val = 0.3880	

Figure 8: New High Yield Bond Issuance



after the second quarter of 1982, zero otherwise.) The results in Table 5 indicate that the dummy variables are insignificant in the majority of cases, while the spline variables are still significant.

Out of all of the dummy variables, only the 1997 variable for horizontal mergers is statistically significant. The 1997 Guidelines concern only horizontal mergers and were intended as a clarification of the existing policy, not as a policy change. The spline coefficient on the 1997 guidelines for horizontal mergers is always negative, but never significant.

Sets of Wald tests, reported in table 6, were done to check whether the coefficients on the spline variables are jointly zero and whether all dummy variables are jointly zero. The hypothesis that coefficients on all dummy variables are jointly zero cannot be rejected for any regression. The hypothesis that all government policy spline variables have coefficients that are jointly zero is strongly rejected for every regression.

3.5 Testing for Different Regimes

Another issue to explore is whether the coefficients on the current market condition variables depend on the government's merger policy. When the government's merger policy is "tight"(that is, the probability that a merger

Table 6: Wald Test Results

	Total	**Horizontal**	**Conglomerate**
H_0: The coefficients on government policy dummies are jointly zero	$\chi^2(5) = 1.79$ $Prob(>) = 0.87$ Accept H_0	$\chi^2(5) = 7.23$ $Prob(>) = 0.20$ Accept H_0	$\chi^2(5) = 1.23$ $Prob(>) = 0.94$ Accept H_0
H_0: The coefficients on government policy spline are jointly zero	$\chi^2(6) = 57.98$ $Prob(>) = 0$ Reject H_0	$\chi^2(6) = 60.21$ $Prob(>) = 0$ Reject H_0	$\chi^2(6) = 75.11$ $Prob(>) = 0$ Reject H_0

will be allowed is small), then the effect of the macroeconomic variables (such as the AAA Bond rate) on merger activity would be obscured. When the private sector believes that the probability of a merger being allowed is substantially large, the impact of the macroeconomic variables should become clear and significant. It is also possible that the effects of bond rates and other variables on mergers may differ over time.

To examine this issue, a set of government regime dummies[21] was introduced and their interactions with market condition variables were analyzed. Wald type tests reveal that coefficients on the interactive variables are jointly non-zero: there are non-linearities. Table 7 reports the coefficients on the explanatory variables in different regimes.

The coefficients on the unemployment rate variable are consistently negative, although not always significant. Keeping other things constant, the business cycle fluctuations have a predictive power in the merger activity movements. The coefficients on the stock market variable are positive for the period from 1968 until 1997 and negative otherwise. Both the unemployment rate and stock market return are significant only in the period from 1982 to 1984, the time when merger activity was the least constrained by the government policy (the Baxter Era).

The coefficients on the bond rate alternate signs. They are positive before 1984 (1992 for conglomerate) and negative afterwards. This may be due to the dual effects, as discussed before, of the bond rates on merger activity. The positive effect on merger activity from an increase in bond rates is the

[21]The dummies cannot be disjoint, because the guidelines are not disjoint policies, but build upon one another. So, for example, the 1982 dummy has a value of one after the second quarter of 1982, zero otherwise.

Table 7: Different regimes

Total Merger	AAA Bond Rate	Stock Market	Unemployment Rate
Before 1968	4.14 (7.68)	-0.11 (0.76)	-6.65 (13.12)
1968 - 1982	0.08 (0.03)	0.03 (0.21)	-0.12 (0.26)
1982 - 1984	0.40 (0.18)	0.72 (0.24)	-0.83 (0.27)
1984 - 1992	-0.04 (0.68)	0.04 (0.11)	-0.24 (0.18)
1992 - 1997	-0.17 (0.13)	0.07 (0.10)	-0.06 (0.16)
After 1997	-0.17 (0.08)	-0.01 (0.03)	-0.02 (0.08)
Horizontal	AAA Bond Rate	Stock Market	Unemployment Rate
Before 1968	0.73 (1.42)	-0.03 (0.14)	-1.15(2.41)
1968 - 1982	0.04 (0.01)	0.004 (0.05)	-0.03 (0.07)
1982 - 1984	0.13 (0.08)	0.30 (0.11)	-0.29 (0.12)
1984 - 1992	-0.04 (0.04)	0.01 (0.03)	-0.08 (0.6)
1992 - 1997	-0.10 (0.9)	0.02 (0.03)	0.01 (0.1)
After 1997	-0.08 (0.4)	-0.003 (0.009)	-0.01 (0.03)
Conglomerate	AAA Bond Rate	Stock Market	Unemployment Rate
Before 1968	2.97 (5.41)	-0.06 (0.54)	-4.77(9.24)
1968 - 1982	0.04 (0.02)	0.01 (0.14)	-0.06 (0.18)
1982 - 1984	0.22 (0.09)	0.36 (0.12)	-0.44 (0.14)
1984 - 1992	-0.01 (0.04)	0.01 (0.07)	-0.16 (0.12)
1992 - 1997	-0.07 (0.06)	0.04 (0.07)	0.05 (0.07)
After 1997	-0.08 (0.05)	-0.001 (0.02)	-0.02 (0.04)

effect of inflation. If depreciation rules are kept constant, an increase in inflation stimulates investment by driving a wedge between the value of new and used capital. The negative effect of the bond rate on merger activity comes from the price effect of financing a merger. As bond rates increase, raising funds to finance a merger becomes increasingly costly. The coefficient on the bond rate is statistically significant and positive for the years 1968-1982 in all three regressions. This period includes the highest inflation rate spikes, and the effects were felt even though government policy towards mergers was tight. As with the other variables, the bond rate is significant for the years 1982-1984 for conglomerate and total merger activity time series. Interestingly, the coefficient on the bond rate becomes significant after 1997 in the horizontal merger time series. The fact that horizontal mergers become sensitive to the availability of financing after 1997 may be attributed to the issuance of the new Guidelines. The clarification of the efficiencies section that occurred in 1997 may have taken away some of the "noise" that was due to uncertainty, and a more stable policy environment promoted a consistent reaction to the availability of financing.

To summarize: when merger activity is least constrained by government policy, the explanatory variables are good predictors of merger activity; there clearly are non-linearities in the merger activity regressions, some of which can be explained by the differences in government policy regimes.

4 A Markov Switching Model of Merger Activity

The preceding section shows that government policy does have a significant influence on mergers and that disaggregation of the time series by type of merger is justified. This section presents an alternative analysis: fitting the time series into a two-state Markov switching model. The two-state Markov switching model allows the merger wave hypothesis to be tested. If horizontal and conglomerate merger time series can be shown to be "in wave" at the same time periods, then the appropriate conclusion is that they do have similar structures. This type of analysis can answer the question of whether the dynamics of the conglomerate and horizontal time series are the same, or if there is something fundamentally different between them. One of the most obvious reasons for the differences, if such are found, is the dissimilar treatment of the two types of merger by the government.

R.J.Town (1992) finds that aggregate M&A behavior is well described by a non-linear Markov model, as developed in Hamilton (1989)[11]. The analysis so far also implies non-linearities in the data. However, the data construction technique used in this paper is different from that of Town, who uses the number of finalized mergers as the measure of aggregate merger and acquisition activity. Also, unlike Town, this paper models horizontal and conglomerate mergers separately.

Following Town (1992) and Hamilton (1989), the two-state system is characterized by the following set of equations:

$$\begin{cases} (y_t|S_t = 0) = \alpha + \beta_1 y_{t-1} + \beta_2 y_{t-2} + \varepsilon_{0t}, & \varepsilon_{0t} \sim N(0, \sigma_0^2) \\ (y_t|S_t = 1) = \alpha + \alpha_1 + \beta_1 y_{t-1} + \beta_2 y_{t-2} + \varepsilon_{1t}, & \varepsilon_{1t} \sim N(0, \sigma_1^2) \end{cases} \tag{2}$$

where S_t denotes the unobservable state of the system (0: low merger state, 1: high merger state) and y_t is the aggregate level of mergers and acquisitions in the economy. The parameter α_1 represents the increase in the mean of the series conditional upon being in state 1. The unobservables in the two states have different variances, allowing for a higher variance in the high merger state. The first-order Markov process governs the transition between states:

$$\begin{array}{l} Prob[S_t = 1|S_{t-1} = 1] = q \\ Prob[S_t = 0|S_{t-1} = 1] = 1 - q \\ Prob[S_t = 0|S_{t-1} = 0] = p \\ Prob[S_t = 1|S_{t-1} = 0] = 1 - p \end{array} \tag{3}$$

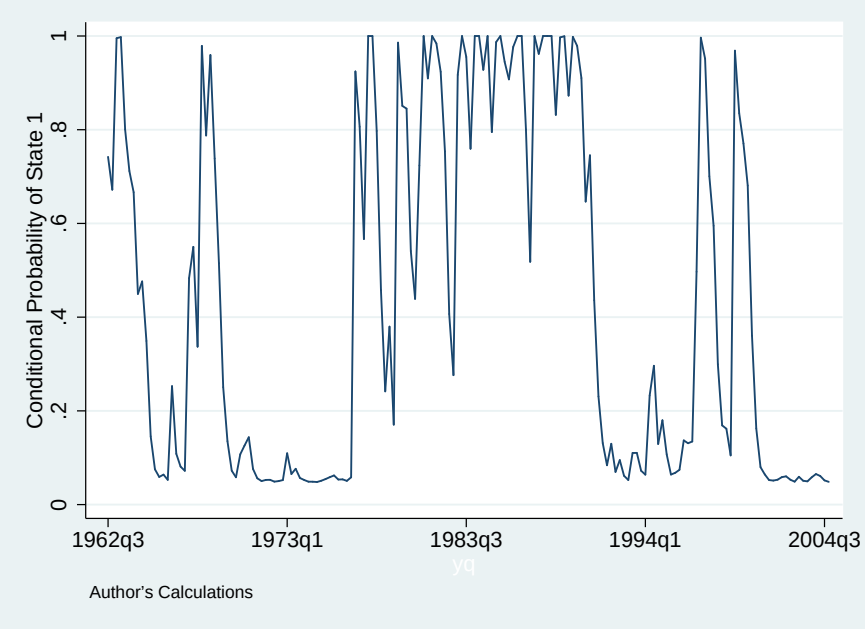
The parameter vector is estimated by maximizing the likelihood function. For more details, see Hamilton (1994), chapter 22 [12]. The estimates in Table 8 confirm Town's observation that the higher merger state has a higher variance and that probabilities of remaining in the current state (p, q) are relatively large. The estimated coefficients are strongly significant.

To see if the results are meaningful it is useful to plot the conditional probability of being in the high merger state: $Prob(S_t = 1|y_t, y_{t-1}, ..., \hat{\theta})$. Figure 9 plots this conditional probability for the Conglomerate merger and acquisition series.

The literature documents three merger waves during the last 45 years. There is some disagreement on the exact dates, but the waves are loosely called the 60s or the conglomerate wave,[22] the 80s wave and the 90s wave. The first merger wave in Figure 9 lasts from the third quarter of 1967 till

[22]Following Town, the M&A activity is said to be in-wave at time t if the conditional probability of being in State 1 is greater than 0.5.

Figure 9: Conditional Probability of High Merger State for Conglomerate Mergers



the first quarter of 1969. The next merger wave starts in the first quarter of 1977, decreases in 1979 and for two quarters in 1982, and ends in the first quarter of 1991. The last merger wave starts in 1997, peaks for about a year, declines for a year, and then goes back up until the first quarter of the year 2000. In short, the conditional probability for the conglomerate merger series is consistent with that suggested in the mainstream literature on mergers.

Figure 10 plots the conditional probability for horizontal mergers. The plot is not as reasonable as the one for conglomerate mergers. An explanation of such an odd graph is that there are no merger waves but a structural break in the series. A possible break is clearly seen at around 1981- 1983. This was a time of a profound policy change, when the governmental view of horizontal mergers changed from one of extreme suspicion to one of understanding the potentially positive effects of such events. Figure 11 plots the conditional probability of being in a high merger state for horizontal mergers if the analyzed data span starts in 1982; see the fourth column in Table 7. If the horizontal merger time series is analyzed from 1982 on, the wave pattern is very similar to that of the conglomerate merger series. There are two merger waves, the first one ending at the first quarter of 1990 (similar to conglomerate mergers) and the second one starting around 1995 and ending around 1998.

Table 8: Markov Switching regression results

Parameter	Total	Conglomerate	Horizontal (All)	Horizontal (from 1982)
p	0.9350	0.9422	0.9366	0.9065
	(0.0734)	(0.0763)	(0.0831)	(0.1571)
q	0.8142	0.8641	0.8614	0.7626
	(0.2198)	(0.1789)	(0.1830)	(0.3956)
α	0.0003	0.0247	0.0057	0.073
	(0.0001)	(0.0083)	(0.0040)	(0.0138)
α_1	0.0013	0.1106	0.0713	0.1770
	(0.0006)	(0.0341)	(0.0300)	(0.504)
σ_0	0.0009	0.0478	0.0291	0.051
	(0.0001)	(0.0054)	(0.0045)	(0.0098)
σ_1	0.0026	0.1482	0.1681	0.1859
	(0.0004)	(0.162)	(0.0183)	(0.0313)
β_1	0.4321	0.3858	0.3351	0.2608
	(0.0753)	(0.0628)	(0.0513)	(0.0529)
β_2	0.4238	0.3518	0.4675	0.2410
	(0.0616)	(0.0688)	(0.0531)	(0.5540)
Log-likelihood	873.23	173.13	207.09	81.09

Figure 10: Conditional Probability of High Merger State for Horizontal Mergers, 1962-2004

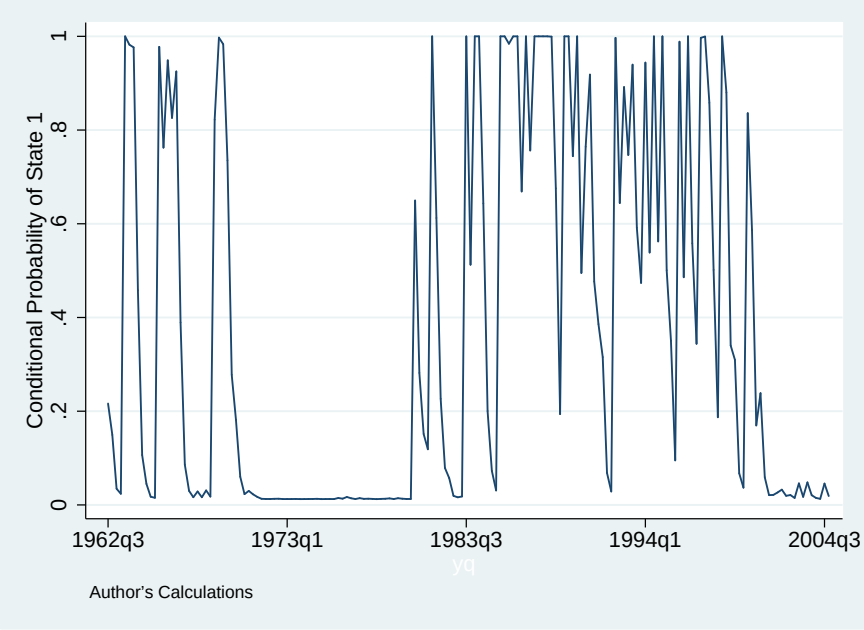
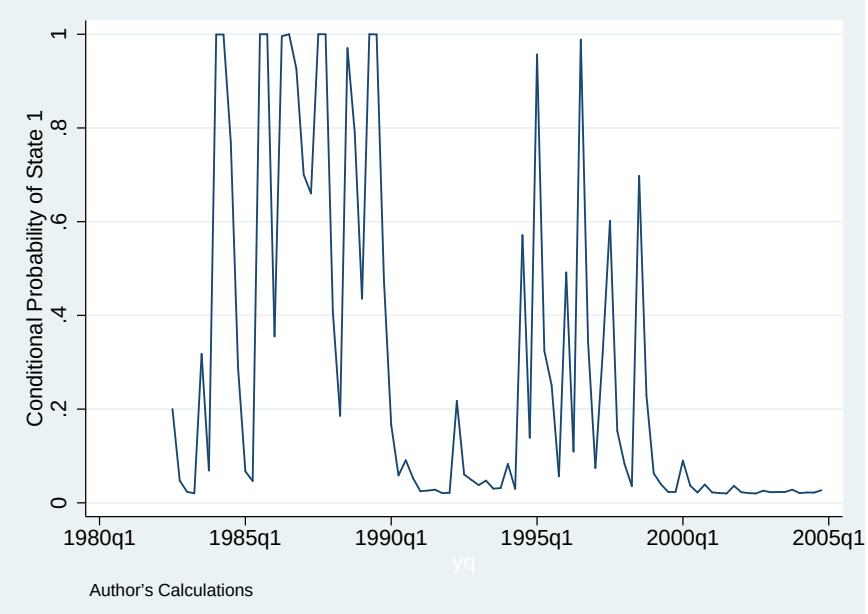


Figure 11: Conditional Probability of High Merger State for Horizontal Mergers, 1982-2004



To summarize, the analysis confirms Town's findings for the aggregate merger activity and reveals different dynamics in the horizonal and conglomerate merger series. The conglomerate merger and acquisition series follows the familiar wave pattern, while the horizontal merger shows a break in the series, which is arguably due to the dramatic policy shift in the early 80s. After 1982, the horizontal merger series follows conglomerate merger behavior. Thus, the horizontal and conglomerate merger time series have different dynamics that can reasonably be attributed to the dissimilar treatments by government over the last half century.

5 Conclusion

This paper analyzes the effects of government policy changes on merger and acquisition activity in the last half-century using a splined time trend. The results predictably and strongly indicate the importance of government policy and are generally consistent with expectations. The coefficients on the government policy spline tell a story: the significant negative effect associated with 1962 (the Brown shoe case) is reversed by the revolutionary 1982 Guidelines; the two latest issues of the Guidelines (1992 and 1997) do not have a significant effect on merger activity, as expected, because neither was intended as a policy change. The magnitude of the effect of government policy differ by type of merger. The horizontal and conglomerate merger and acquisition time series have different means, but respond in similar fashion to changes in current market conditions.

Fitting the horizontal and conglomerate merger time series into the Markov switching model shows that they have different dynamics. This difference is most likely due to the dissimilar treatment of the two types of merger by the government over the last half century. The study shows that only the conglomerate merger and acquisition time series is well described by a two-state Markov switching model. In contrast, the horizontal time series has a break in the early 1980s that may reasonably be attributed to a dramatic change in government policy.

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6 Appendix

6.1 Splined Time Trend

Table 9: Construction of the Time Dummies

Time	**Trend**	**1962**	**1968**	**1982**	**1984**	**1992**	**1997**
1962:1	0	0	0	0	0	0	0
1962:2	0.25	0.25	0	0	0	0	0
...	...	...	...	...	...	...	...
1968:1	7.0	7.0	0	0	0	0	0
1968:2	7.25	7.25	0	0	0	0	0
1968:3	7.5	7.25	0.25	0	0	0	0
1968:4	7.75	7.25	0.5	0	0	0	0
1969:1	8.0	7.25	0.75	0	0	0	0
...	...	...	...	...	...	...	...
1982:2	21.25	7.25	14.0	0	0	0	0
1982:3	21.50	7.25	14.0	0.25	0	0	0
1982:4	21.75	7.25	14.0	0.5	0	0	0
1983:1	22.0	7.25	14.0	0.75	0	0	0
1983:2	22.25	7.25	14.0	1.0	0	0	0
1983:4	22.5	7.25	14.0	1.25	0	0	0
1984:1	22.75	7.25	14.0	1.5	0	0	0
1984:2	23.0	7.25	14.0	1.75	0	0	0
1984:3	23.25	7.25	14.0	2.0	0	0	0
1984:4	23.5	7.25	14.0	2.0	0.25	0	0
...	...	...	...	...	...	...	...
1992:2	31.25	7.25	14.0	2.0	8.0	0	0
1992:3	31.5	7.25	14.0	2.0	8.0	0.25	0
...	...	...	...	...	...	...	...
1997:2	36.25	7.25	14.0	2.0	8.0	5.0	0
1997:3	36.5	7.25	14.0	2.0	8.0	5.0	0.25
...	...	...	...	...	...	...	...
2004:4	43.75	7.25	14.0	2.0	8.0	5.0	7.25

The time trend (Trend) is defined from the first quarter of 1962 through the last quarter of 2004. This study uses quarterly data, thus the increment is 0.25. It is splined into 6 variables: the base year (1962), 1968, 1982, 1984, 1992, and 1997. Each new set of Merger Guidelines was introduced at the second quarter of the year. The new Guidelines effect is zero at or before the quarter of the introduction, and is either a trend or a constant afterward. At each point the sum of values of

Table 10: Proposed Aggregation

This Study	FTC Type	SIC code
Horizontal mergers	Horizontal Mergers, Conglomerate Market Extension	Same 4-Digit SIC code
Conglomerate mergers	Pure Conglomerate, Product Extension	No more then one digit in common
Unidentified	Vertical Mergers (plus)	Within same 2 or 3 digit SIC codes

the spline variables equals the value of the trend.

The Base 1962 variable is equal to the trend up to the introduction of the 1968 Guidelines. After the 1968 Guidelines are introduced, the base year becomes a constant (7.25), and 1968 equals (trend - 7.25). After the 1982 Guidelines are introduced, the 1968 becomes a constant (14.0) as well, and the 1982 variable is equal to the (trend - 7.25 - 14.), etc. The introduction of a new set of Guidelines does not mean an abrupt change, but rather a gradual augmentation of the existing policy, as the message "comes through" to the business sector. The latest up-to-date Guidelines are allowed to have an non-constant effect, while past guidelines have a constant effect. So, for example, the effect of the 1982 Guidelines is still felt in 2001.

6.2 Separation by Type based on SIC codes

Both datasets used in this study have the SIC codes, but only the FTC data includes the type of each merger as defined by the FTC. The FTC data allows for comparison between the division by type as formulated by the FTC and division by type of merger based on the SIC codes.

The FTC large merger series report defines five mutually exclusive types of acquisition. They are (1) horizontal merger, when companies produce closely related product in the same geographic market; (2) vertical merger, when two companies involved in a potential buyer/seller relationship merge; (3) conglomerate product extension merger, when the companies are functionally related, but do not directly compete with one another (for example, a soap manufacturer acquiring a bleach manufacturer); (4) conglomerate market extension merger, when companies manufacture the same product, but sell in different geographical market; (5) pure conglomerate merger of two unrelated firms.

It is not possible to differentiate between horizontal and conglomerate market

Table 11: Aggregation by SIC codes

If None or One SIC digits same	Frequency	Percent
FTC Pure Conglomerate or Product Extension	1,035	78.35%
FTC Horizontal and Market Extension	137	10.37%
FTC Other	149	11.28 %
If Same 4-digit SIC codes	**Frequency**	**Percent**
FTC Pure Conglomerate or Product Extension	86	29.97 %
FTC Horizontal and Market Extension	182	63.41 %
FTC Other	19	62.2%
If Same 2 -3 digit in the SIC codes	**Frequency**	**Percent**
FTC Pure Conglomerate or Product Extension	292	70.36 %
FTC Horizontal and Market Extension	90	21.69 %
FTC Other	33	7.95%

extension mergers based on the SIC codes, because both types involve companies producing the same products and the differences are in geographic market not captured by the SIC codes. Fifty percent of the mergers with parties having exactly same 4-digit SIC codes are horizontal and twelve percent are market extension. Twelve percent is not a very large portion; however, considering how relatively small (3.86 percent of the entire sample) the market extension category is and the fact that out of all market extension mergers forty seven (47) percent have all four digits in common, it can be inferred that both parties having the same 4-digit SIC code is a good indicator of the merger being either a market extension or a horizontal merger. This study will define mergers within same 4-digit SIC code as horizontal mergers, however it is acknowledged that it is different form FTC's definition.

The pure conglomerate mergers involve parties that are in unrelated industries, and, as expected, the majority of them have either zero or one SIC digits in common. Another category that has often has parties with either zero or one SIC digits in common is conglomerate product extension mergers. The conglomerate product extension mergers are the most problematic: they are so numerous and spread out between all categories. However, the majority of the product extension mergers are between companies that have either one or zero of the 4-digit SIC codes in common. This study will call the mergers with no more than one digit of the SIC codes in common "conglomerate mergers"; this type corresponds to combining the FTC's product extension and pure conglomerate types together, that is, the type will capture mergers between companies in unrelated or not closely related industries.

The type of merger between parties that share two or three digits of their SIC code is undefined. Table 10 summarizes the relationships between the type of

merger used in this paper, the type of merger defined by the FTC, and the type of mergers as defined by the SIC codes.

The Table 11 shows which types of mergers as defined by the FTC are captured if the aggregation is done by SIC codes. The group of mergers where at most one digit is the same largely (78.35%) consists of the Pure Conglomerate or Product Extension mergers. In the set of mergers with all four SIC digits in common, Horizontal and Market Extension account for the 63.41 % of all. Note that the Product Extension mergers are the largest group; they account for 43% of all mergers, thus they are unavoidably present in every aggregation by SIC codes.

Thus, even though there is no strong correlation between mergers broken down by FTC types and SIC codes, the aggregation done in this paper is the best approximation available for the given data.

6.3 Summary Statistics

Table 12: Summary Statistics, 1962:1 - 2004:4

Variable	**Mean**	**Std. Dev.**	**Min.**	**Max.**	**N**
Total Merger Activity	0.419	0.351	0.028	1.498	172
Conglomerate Merger	0.221	0.183	0.016	0.905	172
Horizontal Merger	0.143	0.158	0	1.091	172
Other Merger	0.054	0.047	0	0.33	172
Unemployment Rate Moving Average	5.916	1.461	3.43	10.34	172
AAA Bond Rate Moving Average	8.052	2.392	4.229	14.693	172
Stock Market Return Moving Average	0.918	1.543	-5.163	4.355	172
New Issuance of High Yield Bonds (1972:2 - 2004:4)	12.022	11.216	0.055	61.068	137