ACQUIRING ECONOMIC STABILITY: M&A ACTIVITY AS AN AUTOMATIC STABILIZER FOR UNEMPLOYMENT

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Abstract

Current market conditions are particularly conducive to merger and acquisition activity, drawing greater attention to the subsequent macroeconomic impacts. I present empirical evidence suggesting that the effect of M&A transaction volume on the unemployment gap works in opposition to the business cycle and acts as an economic stabilizer. I extend current research that has identified the statistically significant effect of M&A activity on unemployment by analyzing the interaction between deal volume and the output gap. My results imply that M&A activity could act as an economic stabilizer. Therefore, these findings will be critical for policy implementation.

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Introduction

The current market condition boasts historically high returns and pre-recession unemployment levels. Amongst other market indicators, a healthy merger and acquisition (M&A) market is representative of the strong economy. As market conditions change, policymakers and economists must be well informed about the impacts of those changes. In some instances, changes in market activity could initiate more government intervention, while other activity could naturally self-regulate by acting in opposition to the business cycle. Ignoring the ideological debate inherent in these circumstances, throughout this paper I attempt to answer the research question, do fluctuations in M&A activity in the United States work in opposition to the business cycle in order to naturally stabilize employment levels?

Economists hold a longstanding interest in understanding how corporate consolidations affect productivity and unemployment. However, gaps in research prevent the evaluation of the effects of these transactions in a macroeconomic framework. In previous studies, the focus has been confined to the effect of employment levels for the acquirer compared to the target company (Burghardt et al. 2015) or within niche markets (Brown et al. 1988). With my proposed research question, I will extend these findings across the broader U.S. economy and emphasize the impact on a macroeconomic scale. Additionally, I draw my own conclusions about the relationship between M&A activity and unemployment given that much of the published literature identifies competing results. For example, while some studies, such as one focused across all sectors in Finland (Bockerman et al. 2008), conclude that M&A has a negative effect on employment, a study on the U.S. manufacturing, financial, and services sectors indicates a

rise in employment in both the short and long term (Doytc et al. 2011). Therefore, my sample set that focuses on the U.S. across a broad range of industries introduces an additional relationship to evaluate. In the context of different levels of the output gap, my hypothesis is that corporate consolidations lead to greater job losses in times of more frequent M&A, and therefore a reduction in job losses when M&A volume declines. If in an expansionary period M&A serves to increase unemployment, and in a contraction there is a reduction in M&A activity that prevents job losses, this can imply that it acts as an automatic stabilizer. Automatic stabilizers, such as unemployment insurance and income taxes, act to offset economic fluctuations without explicit government intervention. Automatic stabilizers in the economy serve to guide markets towards equilibrium more efficiently and to reduce the frequency of market disturbances.

My data and precedent literature will inform conclusions related to my research question in multiple steps. I will begin by assessing employment changes for a select number of deals to develop credibility for the impact of my research question. This plausibility calculation will serve as foundational support for the proposed mechanism of M&A as an economic stabilizer.

In working towards building my regression specification, I will first identify the corresponding cyclical relationship between M&A activity and the output gap, then analyze the effect of M&A activity on the unemployment gap, and finally estimate this effect in the context of the business cycle. My analysis will be based on panel data of quarterly M&A deals closed between 2000 and 2015 across twenty-three broad industries in the United States compared to quarterly unemployment gaps in those respective industries and quarters. The quarterly output gap serves as a control variable. Additionally, I introduce an interaction between M&A volume and the output gap to emphasize that the effect that an additional transaction has on the unemployment gap depends on market fluctuations. My identification strategy includes fixed

effects to control for omitted variable bias inherent in each industry that are unobserved or immeasurable. This strategy, in combination with my plausibility calculation, will lead to a stronger argument that deal volume per industry within different phases of the business cycle can have a direct relationship with the unemployment gap.

My estimates from the fixed effects regression reveal the partial effect of transaction activity on the unemployment gap based on the isolated effect of transaction volume and the effect across different levels of the output gap. At the mean value of the output gap in my data set, for an additional transaction in a given quarter, the quarterly unemployment rate is expected to increase by 0.0042 percentage points on average, which represents an expected job loss of 6,348 workers in the context of the average size of the labor force in my sample set. The statistically significant and economically meaningful result is consistent with the behavior of an automatic economic stabilizer in which its effect increases unemployment in an expansion and dampens it in a contraction in order to offset economic fluctuations. In order to validate my results, I introduce a series of robustness checks including a change in the unit of measurement for the dependent variable to the quarterly percentage of the natural rate of unemployment, the elimination of an industry with partially missing data, as well as a unit of measurement change for the independent variable to quarterly transaction value in millions of U.S. dollars. All subsequent estimation results remain consistent with my proposed hypothesis.

Overview

Section I assesses the plausibility that the proposed mechanism of M&A activity as an automatic stabilizer is in effect. I develop a case study of 20 impactful deals and the resulting

firm-level employment changes to formalize the significance of the effect of M&A on unemployment and apply it in the context of expansions and contractions.

Section II outlines previous research that serves as a foundation for my research question. To begin, I present existing research that supports the establishment of the relationship between the cyclical nature of GDP growth and M&A volume. Then, I draw attention to the abundance of research on the relationship between M&A activity and unemployment. While researchers have identified the significance of these relationships, I combine these topics to directly evaluate the effect transaction activity can have on unemployment at different periods of GDP growth.

Section III describes the sources of data and the steps towards a fixed effects empirical strategy. This section also develops the context for the model specification.

Section IV summarizes my empirical results. The findings indicate that the partial effect from an additional transaction in a given quarter dependent on different levels of the output gap will create a statistically significant, economically meaningful and positive treatment effect on the unemployment gap.

Section V reviews my findings in the context of implications for policy and discusses potential extensions for further research.

I. Plausibility Calculation

In order to identify the plausible significance of merger and acquisition (M&A) activity on changes in the unemployment gap, I performed a case study to expose the nature of M&A activity's variance over the business cycle. My intention is to assess the relationship, not to insinuate that the two cycles are identical. The case study focuses on a sample set of deals completed between 1980 and 2014. The lower bound was selected because it falls on the first

year of the fourth major historical M&A cycle. The time period includes four full cycles including the cycle beginning in 1980 lasting until 1987, followed by the cycle from 1993 to 2000, and then the cycle from 2003 to 2008 (Choi and Jeon 2010). The analysis also includes a portion of deals completed within the most recent cycle that began in 2012 and is ongoing. Similarly, this period encompasses comparable business cycles with expansions such as the short period from 1980 until 1981, and then the end of 1982 until 1990, followed by the periods 1991 until 2001, 2001 until 2007, and finally the end of 2009 until the present (The National Bureau of Economic Research 2010). The study is confined to the upper bound of 2014. This year was specified based on data availability given that I assess M&A employment effects that are fully realized following a three-year grace period adopted from previous research (Margolis 2008). Furthermore, I focused exclusively on deals completed between publicly traded companies with headquarters in the Unites States defined across 13 broad industry categories. Based on these qualifications, 20 deals were then selected based on their high profile natures and large transaction sizes. The average transaction size across these deals is $61 billion dollars. As a result, the conclusions should be considered in the context of an upper bound given that these deal sizes are above average in magnitude. The final list incorporates deals characterized by a variety of industries and years.

The plausibility calculation evaluates the firm-level employment count for individual companies in the year prior to their deal announcement date, and then compares the combined employment count immediately following the completion of the deal to the employment count three years post-merger or acquisition as shown in Figure 1. The three-year lag is adopted from previous research that indicates that acquisition synergies should be fully accounted for after three years (Margolis 2008). Expectations of appropriate lags vary based on deal type. For

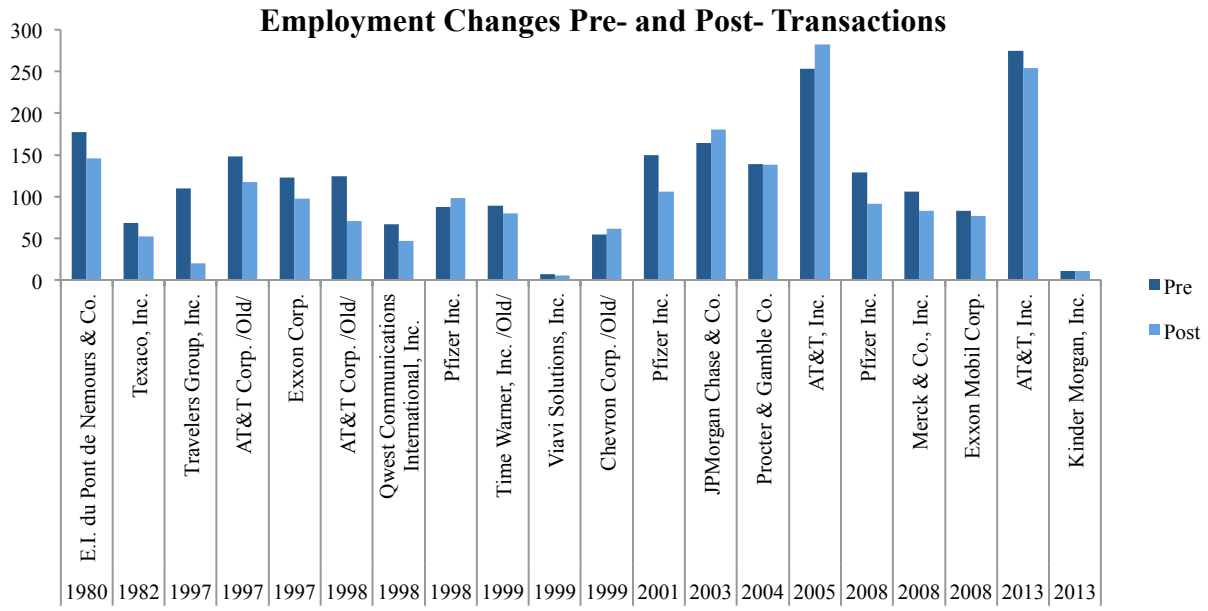

Figure 1. Bar chart display of employment levels (in thousands) pre- and post-transaction.

example, in a hostile takeover it can be expected that a portion of intended layoffs are implemented immediately, whereas strategic growth acquisitions may experience more gradual layoffs from employee overlap, or even employee growth, accounted for after a period that resembles the three years I have specified. Future extensions of this research could consider these different effects across different periods of time.

In the context of this calculation, the deals included were screened and collected from Factset, and firm-level employment data was collected from Compustat. While not every deal evaluated resulted in an absolute employment decline, 80 percent of the deals, or 16 out of the 20 reviewed, revealed a reduction in employee count following the three-year realization period. Overall, the 20 deals revealed a total net reduction in employment of 346,614 persons. In addition, the greatest workforce reduction was 81.66 percent of the original combined count, the

lowest workforce reduction was 0.50 percent, and the median reduction was 18.95 percent. Table 1 represents the results discovered by deal.

Table 1. *20 Deal Case Statistics (in thousands)*

Date	Deal Size	Acquirer	Acquirer Pre-trans Employees	Target	Target Pre-trans Employees	Combined Employees	Post 3yrs	Abs. Change	% Change	Sector
18-Aug-81	$7,300.00	E.I. du Pont de Nemours	135.90	Conoco	41.50	177.40	146.02	-31.39	-0.18	Manufacturing
28-Dec-83	$46,169.95	Texaco, Inc.	60.33	Getty Oil Co.	-	68.09	51.98	-16.11	-0.24	Manufacturing
06-Apr-98	$70,006.98	Travelers Group, Inc.	20.13	Citicorp, Inc.	90.00	110.13	20.20	-89.93	-0.82	Fin. & Insurance
24-Jun-98	$58,009.14	AT&T Corp.	127.80	Tele-Communications	-	147.80	117.80	-30.00	-0.20	Information
01-Dec-98	$83,121.57	Exxon Corp.	80.00	Mobil Corp.	42.70	122.70	97.90	-24.80	-0.20	Min. & Nat. Res.
22-Apr-99	$63,083.96	AT&T Corp.	107.80	MediaOne Group, Inc.	16.85	124.65	71.00	-53.65	-0.43	Information
14-Jun-99	$50,292.63	Qwest Communications	8.70	US West, Inc.	-	67.00	47.00	-20.00	-0.30	Information
04-Nov-99	$93,789.29	Pfizer Inc.	46.40	Warner-Lambert Co.	41.00	87.40	98.00	10.60	0.12	Manufacturing
10-Jan-00	$151,504.92	Time Warner, Inc.	12.10	America Online, Inc.	-	89.30	80.00	-9.30	-0.10	Information
10-Jul-00	$37,748.83	Viavi Solutions, Inc.	6.26	SDL, Inc.	1.00	7.26	5.49	-1.77	-0.24	Manufacturing
16-Oct-00	$43,140.98	Chevron Corp.	36.49	Texaco, Inc.	18.44	54.93	61.53	6.60	0.12	Min. & Nat. Res.
15-Jul-02	$60,520.49	Pfizer Inc.	90.00	Pharmacia Corp.	59.60	149.60	106.00	-43.60	-0.29	Manufacturing
14-Jan-04	$57,808.07	JPMorgan Chase & Co.	93.45	Bank One Corp.	71.20	164.65	180.67	16.02	0.10	Fin. & Insurance
28-Jan-05	$56,207.54	Procter & Gamble Co.	110.00	Gillette Co.	28.70	138.70	138.00	-0.70	-0.01	Manufacturing
05-Mar-06	$84,102.88	AT&T, Inc.	189.95	BellSouth Corp.	63.07	253.02	282.72	29.70	0.12	Information
26-Jan-09	$64,197.86	Pfizer Inc.	81.80	Wyeth Corp.	47.43	129.23	91.50	-37.73	-0.29	Manufacturing
09-Mar-09	$45,704.36	Merck & Co., Inc.	55.20	Schering-Plough Corp.	51.00	106.20	83.00	-23.20	-0.22	Manufacturing
14-Dec-09	$39,343.35	Exxon Mobil Corp.	79.90	XTO Energy, Inc.	3.13	83.03	76.90	-6.13	-0.07	Min. & Nat. Res.
18-May-14	$65,659.70	AT&T, Inc.	243.36	DIRECTV	31.70	275.06	254.00	-21.06	-0.08	Information
10-Aug-14	$47,403.08	Kinder Morgan, Inc.	11.08	KM Energy Partners	0.00	11.08	10.90	-0.18	-0.02	Transp. &Ware.
							Total	-346.61		
							Avg.	-18.06		

In order to understand the impact of M&A on a macro-level, the plausibility calculation results must be compared to average employment levels in expansions and contractions. For the following calculations, I will be approximating values from business cycles within the period 1981 to 2009 given that 2009 is the final year of the last contraction and the current expansion is ongoing. From my case study, the results indicate that an average of 18,055 persons lose their jobs in a given transaction regardless of year. In a typical contraction, there are approximately 3.91 million additional unemployed persons on average, with a shocking approximately 8 million additional people unemployed in the most recent recession from 2007 to 2009 (Bureau of Labor Statistics 2018). There is also a fall in transaction volume by 87.5% from an expansion period to contraction period on average, which represents approximately 15,000 fewer transactions in a typical contraction compared to an expansion (Federal Trade Commission 2015). As a result,

given the decline in number of transactions in a contraction period, more job losses are prevented.

To build this out further, we can see that on average there are approximately 538 transactions in an expansion quarter compared to 338 transactions in a contraction quarter (Federal Trade Commission 2015), with an average of 5 quarters in a contraction and approximately 31 quarters in an expansion (The National Bureau of Economic Research 2010). Therefore, the difference in transactions between a contraction quarter and expansion quarter is approximately 200 transactions. Additionally, over the last 16-year period, the average unemployment rate among workers who were displaced from jobs held for at least 3 years measured every two-year period beginning in January 2007 until January 2018 is 18.2 percent (Bureau of Labor Statistics 2018). This rate indicates that after a transaction layoff, many workers will become reemployed relatively quickly, while 18.2 percent of these displaced workers represent longer-term unemployment and potentially discouraged workers.

With a difference in number of transactions on average in expansion and contraction quarters of 200 deals, an average job loss per transaction in my calculation of 18,055 workers, and an average unemployment rate among displaced workers of 18.2 percent, approximately 657,000[2] jobs are saved in a contraction due to less M&A activity. This degree of job change suggests that, compared to the average 3.91 million job losses in a contraction, total job losses would be approximately 17 percent higher if M&A activity had no change across the business cycle and no impact on unemployment. In conclusion, this plausibility calculation provides substantial ground for the existence of a relationship between M&A activity and unemployment. Furthermore, it introduces the claim that M&A activity could act as an automatic stabilizer.

[2] This figure is calculated based on the following equation: (the difference in number of transactions on average in an expansion and contraction quarter) x (the number of job losses on average in a transaction) x (the average unemployment rate among workers who were displaced)

Additional analysis will reveal the strength of the relationship between M&A activity and unemployment in subsequent sections.

II. Related Literature

The subsequent literature review will begin with the compilation of research outlining the cyclical nature of both M&A transaction activity and output growth, and the pattern overlaps between the distinct cycles. Next, extensive precedent research about the relationship between M&A activity and unemployment is analyzed.

Cyclical Nature of M&A Transactions Relative to Output

The first critical step in testing my hypothesis is the distinction between the M&A cycle and the business cycle. Each cycle has unique drivers, although research studies have found that the nature of M&A activity overlaps with that of the aggregate market economy. The contemporary period of high transaction activity corresponds to characteristics of previous cycles, including an increase in asset reallocation and growing market efficiency. These trends are highly correlated with the business cycle, which directly impact firm cash flow, access to and the expense of outside capital, and the cost of inputs (Choi and Jeon 2010). Figure 2 illustrates the comparable nature of the cycles.

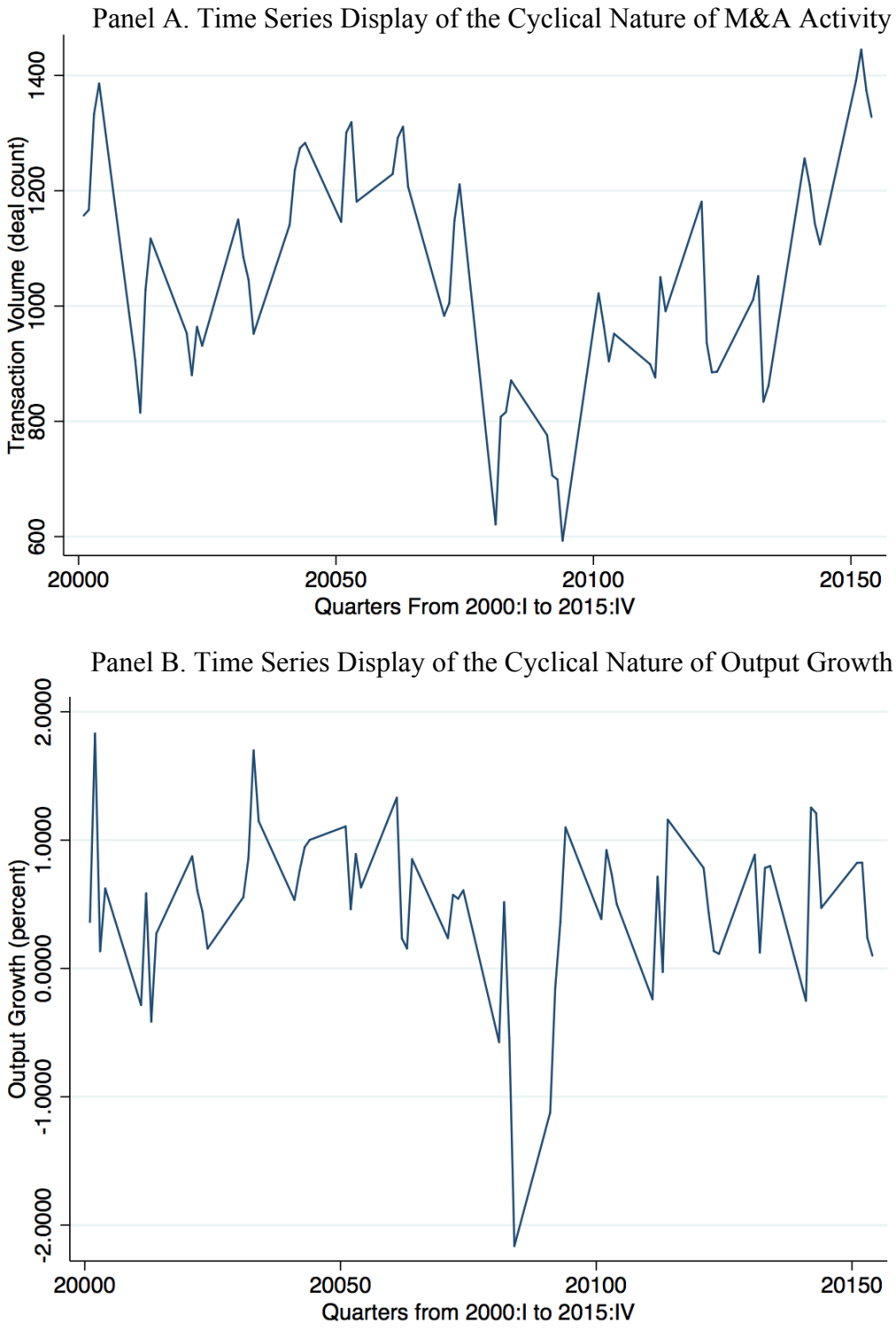

Figure 2. Time series plots highlighting the waves of quarterly M&A activity and the U.S. business cycle from 2000:I to 2015:IV.

In their research, Choi and Jeon find that the expansionary phase in U.S. business cycles are the most conducive for M&A activity using time-series econometric tools applied to a set of macroeconomic variables and various alternative measures of aggregate merger activity. Similarly, Golbe and White identify the strong explanatory power of sine curves used to test for the cyclical nature of M&A. They apply sine waves to time series data on M&A activity in the U.S that results in peaks and troughs aligned with dates in their data set (Golbe and White 1993). Prior to the wave we are experiencing today, historic M&A waves correspond to the periods from the 1890s to 1903 and 1920s to 1929, with a peak in 1968, followed by the periods of the 1980s to 1987, then 1993 to 2000, and finally the most recent wave from 2003 to 2008 (Choi and Jeon 2010). Similarly, NBER official business cycle reference dates indicate that beginning in 1890 there have been 26 cycles with average expansion durations of approximately 41 months. Since 1890, the cycles that experienced at or above the average expansion duration prior to the current cycle include the periods from 1915 to 1918, early 1933 to 1945 with a brief contraction period in between, the end of 1949 to mid-1953, 1961 to 1969, then from 1975 to 1990 with a short contraction in 1982, and finally the two most recent expansions from 1991 to the beginning of 2001 and then the end of 2001 to the end of 2007. This empirical evidence and the conclusions found in behavioral corporate finance suggest that M&A activity is pro-cyclical with respect to the business cycle. In addition, researchers Komlenovic, Mamun and Mishra (2009) focus beyond industry-specific factors driving M&A activity and find a positive and significant relationship between M&A transaction volume and the business cycle.

As prior research has established, and as I corroborate with data shown in Table 2, M&A activity is cyclical, and the nature of the cycles correspond to business cycles within the U.S. As a result, we observe a positive relationship between M&A volume growth and output growth.

Similarly, just as the market has experienced a general upward growth trajectory, M&A volume in general has risen absolutely over time. This relationship serves as a foundation for my subsequent regressions that suggest M&A activity is an automatic stabilizer.

Table 2. *Transaction Volume Across Business Cycles Normalized by Quarter*

Business Cycle Dates	Cycle Type	Transaction Volume
1980:I – 1980:III	Contraction	189
1980:IV – 1981:II	Expansion	236
1981:III – 1982:IV	Contraction	296
1983:I – 1990:II	Expansion	460
1990:III – 1991:I	Contraction	415
1991:II – 2000:IV	Expansion	830
2001:I – 2001:IV	Contraction	377
2002:I – 2007:III	Expansion	393
2007:IV – 2009:II	Contraction	318
2009:III – 2015:IV	Expansion	373

Relationship Between M&A and Unemployment

Researchers have examined the relationship between M&A volume and unemployment; however, prior focus has largely been on productivity and wages, and an analysis of macroeconomic implications is missing. My paper aims to answer the research question: "does the impact of M&A activity work in opposition to the business cycle to automatically stabilize unemployment rates?". Previous research can be used to help inform the potential impact of M&A on unemployment in general, while the additional comparison I make to the output gap will illustrate a direct relationship to the broad economy. I apply the method of fixed effects on panel data across twenty-three industries within the United States from 2000 to 2015. The dependent variable is the unemployment gap in a given industry and quarter, which represents the rate of unemployment relative to a constant rate that is determined not to raise inflation. The independent variable is the transaction deal count in a given industry and quarter. The quarterly

output gap acts as a control variable, building into an interaction term that compares M&A volume and the output gap to highlight the effects of the relationship. My fixed effects identification strategy accounts for immeasurable variables such as industry-specific economies of scale. There is a breadth of existing literature relating employment and M&A activity that highlight the importance of this topic, all of which encompass a variety of primary research questions, in a variety of settings and with a variety of datasets and empirical models.

For example, the specific context of Behar and Hodge's research is not directly comparable to my research question; however, their analysis helps lay the groundwork for the relationship between employment and corporate consolidations. They evaluate the employment effects of mergers in the declining gold mining industry in South Africa for four provinces from 1980 to 2004 (Beha et al. 2008). They selected the gold mining industry due to its measurable and homogenous output of kilograms of gold, as well as the exogenous reasons for mergers (those not related to labor), allowing the effect of the mergers on employment to be casual. Similar to my estimation strategy, they include entity fixed effects for province-specific factors, while also incorporating a Cobb-Douglas production function that models the logs of employment, gold output, and wages with a merger variable and trend term, which is a proxy for technological progress. Following OLS estimations, they find that merger activity in their sample results in a rise in real wages and a decline in employment. The assessment of a single industry allows them to control for many factors, such as industry-specific influences; however, in order to identify broadly applicable results that address questions about the greater economy I examine a more diversified sample set. The preliminary findings of their research imply an employment effect from M&A that supports my hypothesis, while my comparison to the output gap is required to confirm a relationship with different business cycles.

Similarly to Behar and Hodge, Burghardt and Helm perform research that involves a different setting and set of variables, but their research introduces a comparable empirical model relative to mine using interaction terms and dummy variables. In comparison to my industry level data, Burghardt and Helm focus on firm level data in Switzerland between 2001 and 2005 (Burghardt et al. 2015). They use the Swiss Business Census that conducts surveys every 4 years to identify 5,389 firms acquired in the specified period in the secondary and tertiary sectors. As a result, their empirical model uses OLS to relate employment growth to explanatory variables and incorporates a mix of binary and interaction terms to focus on size relative to growth. They then estimate on four models that include a restricted estimation without interaction terms, their primary model with all interaction terms, a model with only manufacturing firms, and one with firms classified as service firms. The results of their findings reject Gibrat's law that the growth of a firm is uncorrelated with initial size, and instead claim that employment growth decreases with a firm's initial size. The main difference between this study and mine is the focus placed on the relative size of the companies observed, as opposed to the relationship with the business cycle.

In another study, researchers Brown and Medoff move towards a similar setting as mine in the United States, but their study uses a different empirical method as well as a more restricted sample set. They analyze unemployment insurance recorded by the Michigan Employment Security Commissions from 1978:III to 1984:IV on over 200,000 firms (Brown et al. 1988). Instead of fixed effects, their empirical model involves a difference-in-differences method in which they compare wages and employment for firms involved in M&A deals, to a control group of firms that had not experienced M&A. Since they focus on the firm level, they are able to distinguish between a control and treatment group, while I focus on the industry level for which

there is no control group and all industries experience M&A activity. In addition, their study differs from mine in scope. Their decision to focus on just the state of Michigan has limitations, as it is not representative of the entire United States. It also fails to accurately account for firms that operate in multiple states, and overlooks many high impact deals outside of their jurisdiction. While they find that M&A can lead to a positive impact on employment, my chosen sample set is more indicative of the broader impact of M&A, as well as more suited to evaluate the interaction with different business cycles.

Researchers Lichtenberg and Siegel extend their sample to broader industry categories in the United States and incorporate a similar account for fixed effects as my empirical model, but contrastingly apply their research on a microeconomic scale. They evaluate employment across administrative and auxiliary establishments for individual firms in the United States between 1977 and 1982 using Census Bureau data (Lichtenberg et al. 1990). They collect data on a firm level; however, they incorporate industry-specific fixed effects to avoid bias similar to my approach. They run their regression twice, once with employment as the dependent variable and then with wage as the dependent variable. The independent variable in both scenarios denotes a binary ownership change variable. I have chosen to evaluate one continuous dependent variable. While the fundamental approach to the empirical model is similar to mine, the largest contrast between this research case and mine is the application scale. Lichtenberg and Siegel focus on the impact of M&A on certain types of employees. Their results reveal that ownership changes lead to a sharp fall in firm employment for auxiliary establishment personnel. This is an important finding for individual firms involved in these deals and their employee expectations; however, my intention is to draw conclusions more broadly about the impacts on entire industries, and ultimately the overall U.S. economy in the context of market responses to M&A.

The setting of Doytch and Mixon and Upadhyaya's research is the most similar literature piece to mine given their analysis of the employment effects of M&A in a broader set of U.S. industries, including the manufacturing, financial, and services industries in the period 1978 to 2008 (Doytch et al. 2011). With respect to their data analysis, as opposed to my use of panel data, they use annual time series data to run individual regressions for the three industries with number of people employed as the dependent variable, and both average wages per hour and the total values of M&A deals as independent variables. They also measure M&A in dollar value, where as my primary measure is in deal count with transaction value appearing in my robustness checks. Their estimations are made in first-difference form to test for stationarity and cointegration to develop claims on long-term effects. The focus of their work is on an assessment of productivity changes resulting from M&A leading to the inclusion of wages per hour as an explanatory variable. Following their results, they argue that M&A leads to a positive short- and long-term effect on employment. Despite the differences in empirical methodology, this study is largely in line with the conceptual questions in my research. However, the researchers here fail to extend their results into a relationship with the business cycle. As a result, it limits the value of their findings in a macroeconomic context.

While literature suggests a general interest in studying the effects of M&A on unemployment, an expansion into a macroeconomic application will help to inform critical effects on economic stability. My research aims to fill this void by building upon current research practices to develop a relationship between M&A and the business cycle. The empirical models proposed in previous literature overlaps heavily with mine, with adjustments primarily dependent on scale and scope of my chosen sample set. As a result, the research I present will

serve as a valuable extension of current research for a critical understanding of the unemployment effect of M&A in the context of the business cycle.

III. Data Description

The data collected to test my hypothesis includes quarterly panel data across twenty-three major U.S. industries between the years 2000 to 2015. This time period was selected in order to include noteworthy business cycles. The transactions included are limited to deals between companies with corporations headquartered in the United States to control for factors that vary across geographic regions and governments.

My data set includes a sample size of about 1,472 data points for most variables, with over 65,500 transactions evaluated. The outcome variable for my project is the unemployment gap, which represents the unemployment rate relative to a constant rate, in industry *i* in quarter *t* collected from the Bureau of Labor Statistics of the United States Department of Labor based on the "Current Population Survey". The survey is conducted monthly by the Census Bureau on the civilian population above the age of sixteen with a probability sample of 60,000 households. My independent variable is quarterly M&A transaction volume measured in number of deals announced in industry *i* in quarter *t*. Data for this variable was collected from Factset and screened for closed deals in the U.S. with announcement dates between the first quarter of 2000 and the last quarter of 2015. Industry classifications are reported based on the acquired company. NAICS codes issued by the Census Bureau are used by both databases for identical industry classifications to ensure consistent comparisons.

In addition, my control variable is the quarterly output gap. The inclusion of this control variable helps to eliminate omitted variable bias associated with the output gap by isolating its

influence on the unemployment gap from transaction volume. The output gap data was collected from the Congressional Budget Office's "Quarterly Budget and Economic Outlook Report" represented as a percentage of potential GDP, which is CBO's estimate of the maximum sustainable output of the economy. The unemployment gap and the output gap are measured in their selected forms in order to highlight their variances as the deviation from potential. While the unemployment rate can be observed as changing cyclically, a falling unemployment rate may not be indicative of a healthy economy. For example, a larger rate of decline of the unemployment rate was experienced after the 2008 recession compared to the decline in recent years, which may be perceived as a weaker economy today; however, the rapid change does not depict the whole story. By incorporating the unemployment gap, the variable is measured as a comparison to the natural rate of unemployment. In a similar manner, output has experienced a relatively consistent upward trend over time, yet different periods of growth and decline must be measured relative to the trend in order to capture it in the context of the business cycle. As a result, the output growth rate could be positive in a recession compared to a previous quarter, so a comparison to the long-term sustainable output rate is more revealing.

Finally, I define an interaction term between quarterly M&A transaction volume by industry and the quarterly output gap to analyze the relationship between M&A and unemployment in the context of different stages of the business cycle. I also include variables for industry fixed effects and idiosyncratic errors. It is important to acknowledge that there are limitations related to the data utilized. For example, future research could extend the scope of the dataset to encompass more specific industry subsets, as well as additional business cycles. In the context of this research, I consider a set of robustness checks that confirm my results despite

these proposed modifications. Table 3 exhibits a summary of the data statistics involved in the analysis that are described in more detail below.

Table 3. *Summary Statistics*

VARIABLES	(1) Obs	(2) Mean	(3) Median	(4) Std. Dev.	(5) Min	(6) Max
Quarter	1,472				2000:I	2015:IV
Industry	1,472				1	23
Unemployment Gap	1,472	2.18	0.02	3.20	-3.90	21.50
Transaction Volume	1,472	45.92	26.00	49.91	0.00	353.00
Transaction Volume$_{-4}$	1,380	44.96	25.00	48.96	0.00	353.00
Output Gap	1,472	-1.81	-1.60	1.88	-5.90	2.40
Output Gap$_{-4}$	1,380	-1.85	-1.85	1.94	-5.90	2.40
Transactions x Output Gap	1,472	-71.76	-34.45	133.30	-961.77	790.97
Transactions$_{-4}$ *x Output Gap*$_{-4}$	1,380	-72.25	-34.15	136.58	-961.77	790.97

To prove or disprove my hypothesis, I will use the following four equations. Let U_{it} be the dependent variable that represents the unemployment gap in industry i in quarter t, T_{it} be the independent variable that represents transaction volume measured in number of closed deals announced in industry i in quarter t, and O_t be the control variable output gap in quarter t. The unemployment gap is measured as $(U - U^*)$, where U is the unemployment rate in industry i in quarter t and U^* is the natural rate of unemployment denoted as a constant 4 percent. The output gap is the percentage deviation from potential and measured as $[(O - O^*)/O^*]$, where O is the quarterly GDP growth rate and O^* is the quarterly long run sustainable output rate. The interaction term $T_{it} \, x \, O_t$ is modeled by augmenting the linear regression model with the interaction term that is the product of the two continuous variables: transaction deal count and the output gap. This allows a unit change in transaction volume to also depend on the output gap to understand the impact on the unemployment gap in the context of different stages of the

business cycle. Finally, the variable ε_i represents industry fixed effects, and the variable u_{it} refers to idiosyncratic errors.

$$T_{it} = \beta_0 + \beta_1 O_t + \varepsilon_i + u_{it} \quad (1)$$

$$U_{it} = \beta_0 + \beta_1 T_{it} + \beta_2 O_t + \beta_3 T_{it} x\, O_t + u_{it} \quad (2)$$

$$U_{it} = \beta_0 + \beta_1 T_{it} + \beta_2 T_{it-4} + \beta_3 O_t + \beta_4 O_{t-4} + \beta_5 T_{it} x\, O_t + \beta_6 T_{it-4} x\, O_{t-4} + u_{it} \quad (3)$$

$$U_{it} = \beta_0 + \beta_1 T_{it} + \beta_2 T_{it-4} + \beta_3 O_t + \beta_4 O_{t-4} + \beta_5 T_{it} x\, O_t + \beta_6 T_{it-4} x\, O_{t-4} + \varepsilon_i + u_{it} \quad (4)$$

In Equation (1), I will highlight the direct relationship between a change in the output gap on M&A activity. I have included industry fixed effects for this equation to account for characteristics that vary across industries and may influence the relationship, such as sensitivity to market changes and average price elasticity of demand for certain products. Equation (2) will be an OLS regression to analyze the effect of M&A on the unemployment gap in the context of the output gap. Next, Equation (3) will incorporate key lag terms measured by four quarters prior in order to more accurately capture the expected delay in the impact of a transaction on unemployment and changes within the economy. Finally, Equation (4) will incorporate entity fixed effects on the panel data to account for industry-specific effects that bias the results from the previous equation.

My empirical method will involve fixed effects regressions because this method will account for industry-specific errors that are immeasurable. In relation to my research case, an entity fixed effect could include industry-specific economies of scale characteristics or unique sensitivity to business cycle changes. Time fixed effects are omitted due to the expected redundancy already accounted for in the business cycle data. In practice, to establish the effect of the interaction between M&A transaction and the output gap on the unemployment gap, I begin

by performing an OLS regression. I anticipate that this will lead to biased results because of the absent fixed effects described. As a result, I incorporate the fixed effects as shown in Equation (4) above to control for these factors. The resulting change leads to a stronger plausible claim of causation, and the classification of M&A as an automatic economic stabilizer.

IV. Empirical Results

My data generates conclusions on my research question in multiple steps using regressions on Equations (1) through (4) that begin with identifying the corresponding cyclical relationship between M&A activity and output, leading to the effect of M&A activity on the unemployment gap in the context of the business cycle with and without time lags to fully realize the transaction effects, and finally using fixed effects to control for immeasurable changes across industries. My regression results indicate that for all plausible values of the output gap, the partial effect of a change in quarterly transaction activity will create a positive treatment effect on the unemployment gap. This is consistent with the behavior of an automatic economic stabilizer in which its effect increases unemployment in a boom and is muted in a recession in order to curb the impact of economic fluctuations. As a result, this suggests an agreement with my proposed hypothesis. Table 4 provides a summary of the findings that I will discuss in detail.

Table 4. *Regression Estimates*

VARIABLES	(1) M&A Relationship with the Output Gap	(2) OLS-Unemployment Gap	(3) OLS-Unemployment Gap with Time Lags	(4) Industry Fixed Effects-Unemployment Gap
T		-0.00946***	-0.00747***	0.000268
		(0.000920)	(0.00253)	(0.00240)
T_{t-4}			-0.00119	0.00209
			(0.00229)	(0.00156)
O	3.134***	-0.925***	-0.911***	-0.923***
	(0.989)	(0.0577)	(0.0849)	(0.126)
O_{t-4}			-0.170**	-0.121**
			(0.0708)	(0.0515)
T x O		0.00268***	0.00363***	0.00236**
		(0.000534)	(0.000870)	(0.00113)
T_{t-4} x O_{t-4}			-0.000501	-0.00110**
			(0.000685)	(0.000561)
Constant	12.72***	1.141***	0.804***	3.411***
	(1.785)	(0.117)	(0.147)	(0.274)
Observations	1,472	1,472	1,380	1,380
R-squared		0.298	0.300	
Number of IndID	23			23
Industry Fixed Effects	YES	NO	NO	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

In the first step towards testing my hypothesis, the OLS regression from Equation (1) that accounts for heterogeneous robust standard errors identifies that for a 1 percent increase in the output gap, the number of quarterly M&A transactions is expected to increase by approximately 3.1 deals. The average number of quarterly transactions across all twenty-three industries from 2000 to 2015 is approximately 46 deals, and the average quarterly transaction value is $5.2 billion. Comparing these averages to the magnitude of the coefficient, a change of 3.1 deals per quarter is 6.8 percent of the average number of deals closed and results in an increase in transaction values of $16.3 billion. The result of this regression is an important foundational step

towards testing my hypothesis, which emphasizes that M&A transaction activity fluctuates cyclically and in accordance to the business cycle. As a result, the next step is to assess the effect on the unemployment gap of an additional transaction dependent on different levels of the output gap.

The second step of testing begins with the OLS regressions on Equation (2) and Equation (3) to determine the partial effect of transaction volume on the unemployment gap in the context of the business cycle. The interaction between the two continuous variables transaction volume and output gap incorporates the effect of transaction activity on the unemployment gap across different levels of the output gap in addition to the unique effect of transaction activity. This acts as an interpretation of the effect of transactions within different stages of the business cycle. The partial derivative with respect to transaction volume of the regression equation is used to interpret the model's coefficients. As a result, the partial derivative of the regression from Equation (1) indicates that the effect of transaction activity depends on β_1, β_6 and the output gap, which is expressed as $\beta_1 + \beta_6 O_t$. This equates to -0.0095 + 0.0027O_t. At the average output gap level, this results in a decrease of the unemployment gap by 0.0095 percentage points. Similarly, Equation (2) assesses this relationship with the inclusion of time lags to impose a grace period of four quarters in which the effect of the transactions can be realized by the labor force. In this case, the partial derivative results in -0.0012 + 0.0005O_{t-4}. At the average output gap level, this represents a decrease of the unemployment gap by 0.0012 percentage points. These values are statistically significant; however, given the unaccounted for factors within the error terms in the standard OLS regressions, my empirical strategy identifies the fixed effects method as a necessary step to address the omitted variable bias that is interfering with the true magnitude of the results.

Therefore, in order to account for the influence of industry-specific fixed effects, I ran a fixed effect regression using Equation (4). The partial derivative equates to $0.0021 + -0.0011O_{t-4}$, which, at the average output gap level, results in an increase of the unemployment gap by 0.0021 percentage points. Based on these results, for most plausible values of the output gap[3], M&A activity has a positive treatment effect on the unemployment gap. Unemployment will therefore rise as the output gap rises similar to the expected nature of an automatic economic stabilizer. Figure 3 illustrates this relationship showing the conditional marginal effect of transaction volume on the unemployment gap across different values of the output gap. We see that the slope of transaction volume on the unemployment gap gradually increases as the output gap becomes larger, indicating a positive interaction effect.

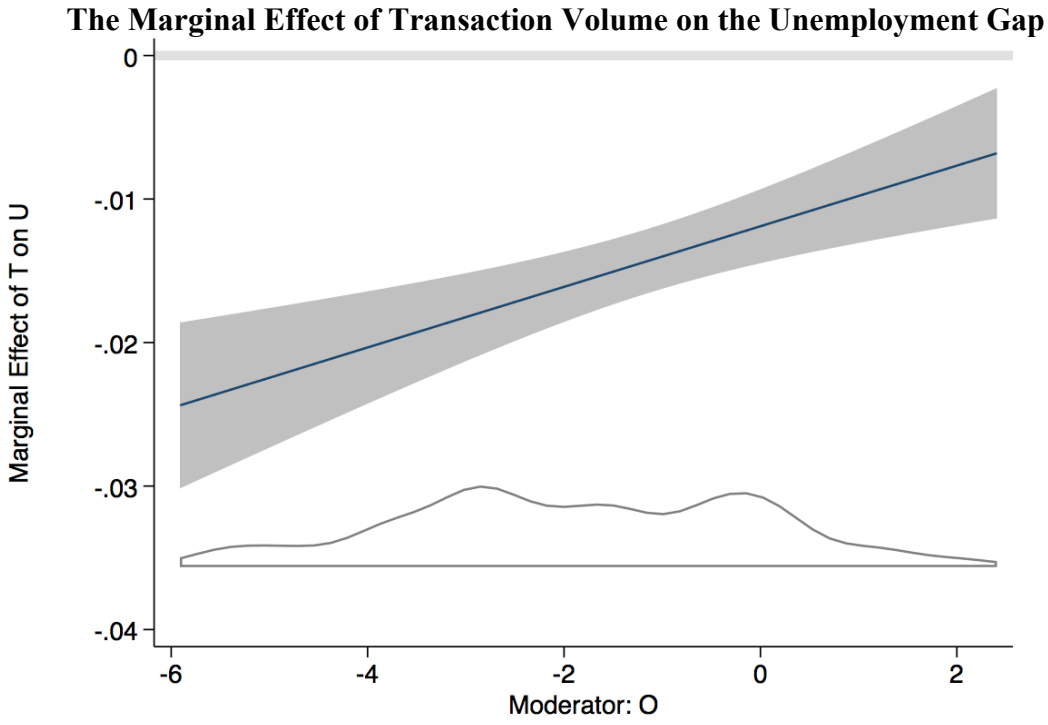

Figure 3. Graph of the conditional marginal effect of transaction volume on the unemployment gap across values of the output gap. The bottom of the graph illustrates the distribution of the output gap.

[3] In order for this not to be true, the output gap needs to exceed 2 percent. This occurs only once across the 60 quarters observed in my data set.

In summary, the statistical significance and positive direction of the overall partial effect of transaction volume on the unemployment gap in my final regression supports my proposed hypothesis that M&A activity can act as a economic stabilizer. Further analysis based on the range of data from a standard deviation above and below the mean output gap, which contains approximately 68 percent of the collected data, confirms my findings. This range accounts for a difference of 0.05 percent. With respect to the unemployment gap, for a 0.05 percent increase in the output gap, the unemployment gap is still expected to increase by 0.002 percentage points on average. The economic implications of this effect implies that the unemployment rate will rise an additional 0.002 percentage points above the natural rate of unemployment at that level of output. Over the observed period, growth in the unemployment gap by 0.002 percentage points will lead to an increase of approximately 3,090 unemployed Americans. In the context of comparable research projects, my results are more conservative than other findings. Other researchers also identified a significant positive relationship between M&A activity and unemployment (Lichtenberg et al. 1990). While many measured the effect in terms of employment count (Beha et al. 2008), various conclusions suggest the effect is approximately 0.04 percentage points compared to my estimated 0.002 percentage points (Bockerman et al. 2008). It is challenging to make direct comparisons to these results as previous research has assessed the direct relationship of M&A activity on unemployment or employment, whereas my assessment of my interaction term identifies an alternative effect. Nevertheless, my estimation strategy and statistically significant estimations plausibly establish causation and support my hypothesis that M&A activity can act as an automatic economic stabilizer.

Robustness

In order to validate my results, I have introduced a series of robustness checks to account for measurement errors, endogeneity or other identification problems. In the first check, I change the unit of measurement for the dependent variable, unemployment gap, to the quarterly percentage of the natural rate of unemployment. This is the process by which the output gap is measured, and represents the percent change of the unemployment gap from the potential natural rate of unemployment of 4 percent. Following a fixed effects regression, the estimated impact on the unemployment gap is very similar in magnitude to my original findings with comparable statistical significance.

In an additional robustness check, I confirm my initial findings by eliminating an industry with incomplete unemployment gap data. This includes the industry "Internet Service Providers and Data Processing Services". By excluding it from my regressions, my dataset becomes balanced. The resulting estimations confirm my initial results and maintain an only slightly lower magnitude of the overall partial effect and decline in statistical significance.

In the final robustness check, I change the unit of measurement for the independent variable from quarterly transaction volume to quarterly transaction value in millions of U.S. dollars. Following a fixed effects regression, the estimated impact on the unemployment gap is much smaller in magnitude. Transaction value is only available for a fraction of the deals that have closed in the included industries and quarters because it is dependent on publicly released information. Although the results do not disprove my original estimations, it is important to acknowledge that there are fewer available data points to analyze. Overall, as only subtle changes persist within these robustness checks compared to my original estimations, they

ultimately bolster my results and hypothesis that suggests M&A activity is a economic stabilizer in the U.S. economy. The results from the robustness check regressions are displayed in Table 5.

Table 5. *Robustness Check Estimations*

	(1)	(2)	(3)
VARIABLES	Robustness Dependent Variable (Change in the Unemployment Gap)	Robustness Balanced Data (Unemployment Gap)	Robustness Independent Variable (Transaction Value)
T	-5.58e-05	0.00436*	1.77e-05**
	(0.000685)	(0.00229)	(7.28e-06)
T_{-1}	0.000276	0.00162	4.95e-06
	(0.000455)	(0.00147)	(6.10e-06)
O	-0.221***	-1.024***	-0.868***
	(0.0383)	(0.111)	(0.104)
O_{-1}	-0.0276**	-0.146***	-0.147***
	(0.0137)	(0.0559)	(0.0441)
T x O	0.000517	0.00415***	3.73e-06
	(0.000331)	(0.000979)	(3.35e-06)
T_{-1} x O_{-1}	-0.000297**	-0.000658	6.79e-07
	(0.000143)	(0.000797)	(1.65e-06)
Constant	0.880***	3.167***	3.461***
	(0.0877)	(0.237)	(0.233)
Observations	1,380	1,320	1,380
Number of IndID	23	22	23
Industry Fixed Effects	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

V. Conclusion

The market today is experiencing a peak in M&A activity, garnering attention from economists and policy makers who are tasked with evaluating the health of the economy and the path towards full employment. Researchers have examined the relationship between M&A volume and employment; however, an analysis of macroeconomic implications is absent.

Through the evaluation of panel data on quarterly M&A deals closed from 2000 to 2015 across twenty-three industries in the United States, I establish that M&A activity resembles the cyclical nature of national output and I assess the implications of the partial effect of M&A volume across different levels of the output gap on the unemployment gap. Based on my empirical strategy that relied on a fixed effects regression, my results reveal a strong relationship between a rise in transaction activity coinciding with a rise in the output gap and a rise in the unemployment gap. The nature of these findings support my proposed hypothesis that M&A activity can act as an automatic stabilizer because of its impact on the unemployment gap that works in opposition to the business cycle. The relationships are statistically significant and economically meaningful with respect to the greater United States economy.

In order to further confirm the validity and meaningfulness of these results, additional empirical strategies can be conducted, such as the use of the Bartick method, in order to remove all doubt associated with omitted variable bias. This method would allow for further scrutiny to verify economic significance. In addition, a more nuanced analysis of different time lags could inform researchers about the different effects associated with different categories of M&A transaction motivation. For example, hostile takeovers may provide for a more immediate employment effect, whereas a strategic growth acquisition may result in different long term effects. Nevertheless, my research reveals the overall significance M&A activity can have as an automatic stabilizer and serves as a foundation for further research.

The findings evident in this research have meaningful policy implications. In the context of the current market, low interest rates hinder The Fed's bandwidth for monetary policy, while the passage of fiscal policy stimulus packages is subject to political gridlock. As a result, it is in the best interest of the economy to strengthen mechanisms that inherently stabilize the economy,

such as automatic stabilizers. The implications of the size of M&A activity's influence on unemployment indicates that it could help self-regulate the market. As a result, these findings could inform antitrust implementation. The Federal Trade Commission and the Department of Justice could consider the relaxation of enforcement in expansions, in which a rise in number of transactions and unemployment will offset the heating economy, and greater enforcement in contractions, in which fewer transactions will reduce job losses. While the rhetoric surrounding the concentration of corporate power involves justified criticisms, and severe external consequences related to antitrust should be considered, in general, my research indicates that the direct relationship between M&A activity and unemployment across different phases of the business cycle can serve as a powerful policy tool for automatic stabilization.

VI. References

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VII. Appendix

Table 6. *Individual Industry Statistics and Heterogeneous Effects*

Industry	Average Transaction Volume	Average Unemployment Gap	Partial Effect of Transaction Volume
Agriculture, forestry, fishing, hunting	7.063	5.438	0.1155
Mining, quarrying, oil and gas extraction	36.328	1.666	2.28×10^{-19}
Utilities	25.250	-1.148	1.56×10^{-19}
Construction	38.219	6.609	-2.00×10^{-19}
Manufacturing			
Food manufacturing	27.516	2.722	4.07×10^{-19}
Beverage and tobacco products	8.297	1.169	1.18×10^{-19}
Textiles, apparel, and leather	12.906	5.361	-2.25×10^{-19}
Petroleum and coal products	5.047	0.608	3.80×10^{-19}
Primary metal manufacturing	12.813	2.306	-2.21×10^{-19}
Wholesale trade	84.813	0.886	1.98×10^{-19}
Retail trade	78.250	2.772	-7.14×10^{-19}
Transportation and warehousing	33.703	2.044	-1.57×10^{-19}
Information			
Publishing, except internet	86.625	1.213	-9.42×10^{-20}
Motion pictures and sound recording	12.750	5.392	5.09×10^{-19}
Radio & TV broadcasting and cable	63.344	0.989	-1.15×10^{-20}
Telecommunications	121.078	1.561	-1.82×10^{-19}
Internet providers and data processing	21.547	-1.938	6.28×10^{-19}
Finance and insurance	189.813	-0.294	1.80×10^{-21}
Real estate	28.219	0.425	-5.13×10^{-19}
Educational services	14.859	0.658	6.30×10^{-20}
Health care and social assistance	81.859	-0.203	9.13×10^{-20}
Arts, entertainment, recreation	18.859	4.438	2.23×10^{-19}
Accommodation and food services	46.906	5.058	-1.14×10^{-19}