THE HOUSE PRICE IMPACTS OF CORPORATE HEADQUARTER RELOCATIONS

ABSTRACT

This project examines the house price impacts of corporate headquarter relocations. Corporate relocations potentially impact house prices through the increase or decrease in local economic activity that results from the relocation event. Using a difference in difference approach, I compare the impacts of a relocation on a metropolitan statistical area (MSA) house prices to house prices in similar metropolitan statistical areas that have not seen relocations by corporations. Local house price indexes from the Federal Housing Finance Agency (FHFA) are used to examine changes in house prices at the MSA level to gage a relocation effect. Data on the housing market characteristics from the U.S. Census Bureau is used to create a sample of comparison cities. Analysis is conducted using data before and after a relocation to analyze house prices appreciation rate impacts from a corporation's headquarter relocation or merger. It is expected that data will indicate a negative effect due to the exit of a firm and a boost to the local economy that receives a firm's new headquarters.

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The House Price Impacts of Corporate Headquarter Relocations

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1. INTRODUCTION

The location of a corporation's headquarters is an important element of the corporation's brand and contribution to a local economy. Headquarter relocations are rare – my research identifies only thirty-four corporate relocations of Fortune 1000 companies between 2000 and 2015, yet they are high-profile events for a metropolitan statistical area (MSA). The companies I observe relocate away from an MSA where the firm was established for a long period of time.

Announcements by companies to move their headquarters to a new MSA focus on growth/expansion and strategic advantages. In the *Corporate Headquarters Challenge*, published in April 2003, Mark Sweeney states: "The leadership of the firm must be convinced that the strategic and long-term interests of the company are best served in a new location and that the firm must accept the costs as an investment in its future." Many firms relocate their headquarters to reposition their image and brand into a new marketplace in hopes that a relocation will establish a new identity. In my sample I also observe about ten mergers and acquisitions. Factors in a firm relocating its headquarters include: (1) attract a talented work force, specifically millennials' desire to live in a central business district where they can work and play; (2) local tax incentives; (3) cost of living differences between large metropolitan areas and mid-size cities; (4) cost of doing business and proximity to transportation channels to maximize market share.

Corporate headquarter relocations impact the local economy either through a diminution in the workforce or influx of employees moving into a new metropolitan statistical area (MSA). Since employees contribute a significant portion of their wages to housing, the price of residential properties are expected to be impacted by a migration or relocation of workers[1].

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[1] In 2002, households in the United States spent 19.2% of average annual expenditures on shelter (US Bureau of Labor Statistics, 2002.)

Gabriel et al. in a 1993 publication titled *The Effects of Regional House Price and Labor Market Variability on Interregional Migration*, explain that "areas with high house prices will attract fewer migrants holding other factors constant." It is expected that a positive headquarter event (entrance into a new MSA) will stimulate the local economy and potentially increase house prices as employees and their families purchase available inventory of residential properties. In contrast a negative headquarter event (corporation exiting an MSA) is detrimental to the local economy as economic activity declines and house prices decline as supply on the market increases. Figure 1 shows house price movements in Newark, New Jersey when Sealed Air Corporation (packaging company known for producing bubble wrap) relocated out of the city in 2014:3 and Mercedes-Benz establishing its new U.S. headquarters in Atlanta. As it can be seen, house prices fall following an exit of a firm and rise preceding an entrance of a headquarter.

Figure 1. Positive Event vs. Negative Event Impact on House Prices
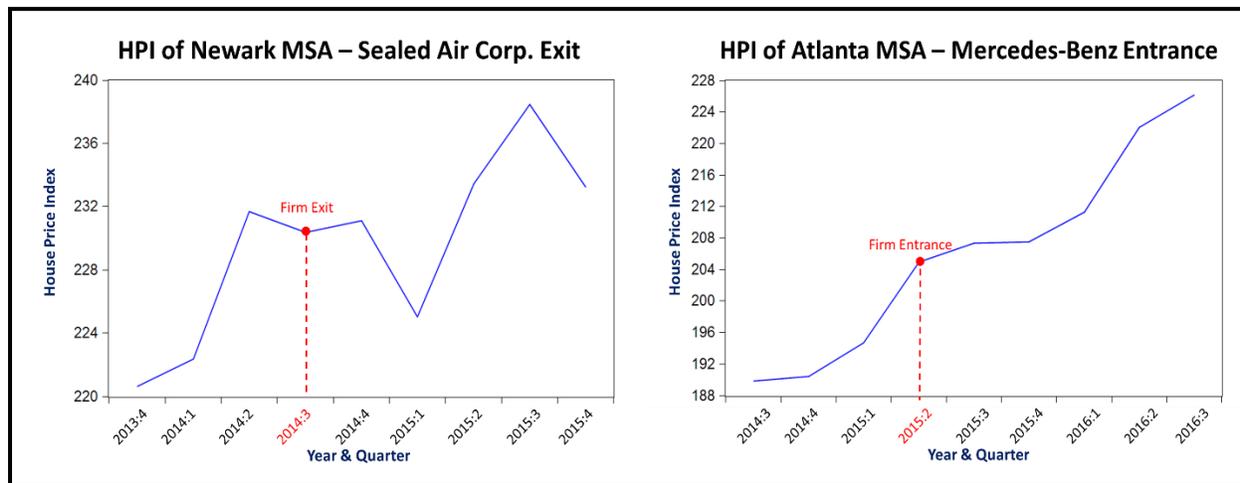
Residential house prices are determined through: (1) economic base; (2) employment multiplier; (3) short-run and long-run equilibrium in housing markets. Economic base is the ability for an area (i.e. metropolitan statistical area) to produce a commodity or service that it exports to other locations. Base industries bring in dollars to a community, which help boost the

local economy, expand service industries, and result in high house prices. For example, Seattle economic well-being is dependent on the aviation and online retail industries and Las Vegas's base industry is hospitality and tourism. Because land is immobile, the existence of a base industry within an MSA is essential to maintain and create growth in property values. When MSAs are able to attract diversity within multiple industries, the local economy is less vulnerable to corporations entering and exiting a specific MSA. In addition, export businesses significantly impact a local economy since they bring capital that is reinvested in the local community. In Jacobus' textbook *Real Estate Principles*, he states that the general rule for the employment multiplier is "each base industry job creates two service industry jobs." The effects of changes in a location's economic base are analyzed through the basic supply and demand equilibrium model. A robust base allows for growth and prosperity.

Residential house prices fluctuate through demand and supply in the space and asset markets. The space market is "local" since real estate is immobile and the local price of space fluctuates with local economic conditions. MSAs witnessing a corporate relocation event may witness a significant impact in house prices compared to an MSA that does not experience an event at the same point in time. Demand increases as employees and their families begin to purchase homes in the new MSA and supply increases in the existing MSA as employees list their current properties in the market. This report analyzes the house price impacts of corporate headquarter relocations; it is expected that there will be unbalance in the house prices as house prices will rise due to an entrance and decline due to an exit of a corporation. The rest of this report is organized as follows: section 2 reviews existing research on the impacts of corporate relocation events; section 3 discusses sample construction and data sources; empirical findings are presented in section 4; section 5 presents my empirical model; and section 6 concludes.

2. LITERATURE REVIEW

Corporations relocate their headquarters to new metropolitan areas for numerous reasons such as garnering tax breaks, attracting millennials who desire to work and live in urban areas, and due to other economic and environmental factors. In this section, I review five recent papers that examine firm headquarter relocation events. These papers examine different aspects of firm relocation events including whether or not to make the decision to relocate and the effects a corporate relocation creates on the local economy within a metropolitan area. While these papers explore the effects on a wide array of economic factors, my research isolates the effects of corporate relocations on the house prices in the residential real estate market.

Card, Hallock, Moretti (2009)

In this paper, Card et al. examine the impact of the presence of corporate headquarters in a city on the charitable contributions to local non-for-profit organizations. Many hospitals, colleges and universities, charities, and cultural institutions are designated as tax exempt organizations by the U.S. Internal Revenue Service (IRS). Employees of corporations are typically active members of their communities, and thus are involved with non-for-profit organizations. In addition some corporations offer matching donations to non-for-profit organizations by their employees; both employees and corporations receive tax benefits by donating to such organizations. Card et al. analyze how highly-compensated employees impact donations to non-for-profit organizations and how these donations impact the local community's economy.

Card et al. create a data base that includes corporate headquarter locations from 1989 to 2002 of all publicly traded corporations combined with data on charities in large metropolitan

cities. First, the Compact Disclosure database is used to gather data on all active U.S. firms listed either on the New York, American, and NASDAQ stock exchanges between 1989 and 2002. Next the creation of a commercial zip code conversation program to map the five digit zip codes for each corporate address in a MSA is used to isolate the effects of corporate donations within a specific geographic zone. To consider that corporations are attracted to cities with particularly successful local charities, a time lag in the entrance of a corporate headquarters to a city is considered in a separate regression model. Data on the success of local charities is compiled from the Internal Revenue Service (IRS) and released by the National Center for Charitable Statistics.

The authors use a regression model that accounts for city-specific economic effects, time in history effects, changes in the city under examination, and a measure of the presence of corporate headquarters in the city in a specific year. Card et al. find that corporate headquarters create approximately three to ten million dollars per year in contributions to local organizations. In addition, for every one-thousand dollar increase in the market value of a firm, they find that a non-for-profit organization generates an average of $0.60 to $1.60 in donations. An increase in charitable donations is attributable to an increase in the number of employees living and working within a community.

Saks (2007)

Saks explores the extent to which metropolitan area employment growth is constrained by housing supply. The effects of the housing supply on labor markets are analyzed by using a model to illustrate the elasticity of the housing supply and its impacts on the local labor market. The model calculates shocks to the labor market compared to the national unemployment rate.

Saks creates a measure of housing supply elasticity by examining the supply of residential properties and local market characteristics.

Saks compiles data and information from multiple sources to construct an index on housing supply regulation. The following ten metrics are included in the index to analyze supply regulation of eighty-two metropolitan areas: (1) annual values of housing stock; (2) house prices based on the repeat-transactions price indexes published by the Office of Federal Housing Enterprise Oversight; (3) total non-farm employment in a metropolitan area; (4) wages; (5) unionization; (6) state regulatory index on labor and school choice regulation, workers compensation, environmental legislation, and regulations in the trucking, insurance, and public utility industries; (7) metropolitan area age (decade in which the area became a metropolitan area); (8) labor demand shocks; (9) low-demand metropolitan areas that experience population growth of less than 1.1 percent per year. The use of information on land use regulations in each metropolitan area allows for the evaluation of the responsiveness of the housing supply to meet the demands in the real estate market. In addition Saks uses data from the U.S. Census Bureau to analyze migration patterns of millennials and minorities within the United States prior to 2000.

Saks concludes that a shortage in the supply of residential properties available affects employment and wage growth in metropolitan areas where the local government heavily regulates construction of residential properties. Cities with a higher degree of regulation also experienced a decline in housing construction relative to cities with less regulations in the time period of 1980 to 2000. Empirical analysis in this paper also concludes that the unemployment rate declines in cities where the demand and supply of residential properties are in equilibrium.

Smart Growth America and Cushman & Wakefield (2015)

In this report published by Smart Growth America in conjunction with Cushman & Wakefield and the Center for Real Estate and Urban Analysis at The George Washington University, Smart Growth America conducts research through first-hand accounts on companies moving to and investing in walkable downtown locations. This report examines the characteristics, motives, and preferences of companies that have either relocated, opened new offices, or expanded in walkable downtown locations between 2010 and 2015. Smart Growth America also reports the industries of companies that have moved or made new investments in downtowns by interviewing corporate leaders on their motivation and characteristics sought in a new headquarter location.

In conducting their research, Smart Growth America partnered with Cushman & Wakefield, a leading global commercial real estate brokerage firm, to identify nearly five-hundred companies that have relocated their headquarters between 2010 and 2015. In order to analyze the trend of businesses moving their headquarters downtown, research is gathered from news and corporate business reports and press announcements. Cushman and Wakefield also assists with conducting surveys regarding relocations, consolidations, expansions, as well as the creation of new offices. Smart Growth America isolates their research to focus on firms relocating to urban business districts that have a walkable environment. Forty-five interviews are conducted with corporate executives to discuss their firm's decision to relocate, focusing on corporations moving to major metropolitan areas. Thus, the study seeks to better describe and understand the trend that central business districts (CBD) are increasing their workforce and employment rates.

Through its partnerships, Smart Growth America concludes that new headquarter locations are dramatically more pedestrian friendly as employees overwhelmingly value a work-life balance that includes neighborhoods where they can walk, bike, or use public transportation. On average companies improved their walk score by seventy percent, access to public transportation by fifty percent, and bike score by fifteen percent. The report indicates that two-hundred and forty-seven out of the five-hundred corporations analyzed relocated from a suburban location to a central business district to enhance their brand identity and company culture by attracting and retaining talented workers that value an eco-friendly neighborhood and work-life balance.

Strauss-Kahn & Vives (2006)

The decisions of corporations to relocate their headquarters within the United States between 1996 and 2001 is discussed in this paper. Strauss-Kahn and Vives use a database of about thirty thousand U.S. headquarters comprised from Dun and Bradstreet (D&B) to analyze the characteristics of both the firm and the metropolitan area. The database indicates that headquarters are predominantly clustered in the same metropolitan area. For example, New York City is home to fifteen percent of the total number of headquarters representing twenty-one percent of headquarters' sales, as of 2001.

The use of an empirical methodology is critical in analyzing the determinants of the decisions regarding the location of headquarters; a profit equation allows Strauss-Kahn and Vives to work under the assumption that firms choose a location that yields their shareholders the highest returns. Strauss-Kahn and Vives also use a theoretical model to account for variables that influence the reasoning behind a corporate move: production costs (i.e. wages and relocation costs), operating costs (i.e. construction of new facilities, marketing, etc.), and environmental

variables (i.e. corporate tax breaks). Strauss-Kahn and Vives expect a negative coefficient on wages as they predict that high wages decrease a firm's willingness to relocate its headquarters. Essentially a company does not want to pay premium wages compared to its current wages – minimize internal costs to maximize profits.

Strauss-Kahn and Vives conclude that headquarters relocate to metropolitan areas with good airport facilities, low corporate taxes, low average wages, high levels of business services, same industry specialization, and agglomeration of headquarters in the same sector of activity. Metropolitan areas desire to lure headquarters to relocate in order to gain a higher per-capita income; headquarters attract other business services and a larger white-collar workforce. Boeing is an example of a corporation that relocates from Seattle because the local government in Chicago offers infrastructure and tax incentives that Seattle cannot offer. The results presented in this paper also imply that a metropolitan area wants to keep and attract headquarters by offering economic benefits.

Rhoades (2014)

In this paper, Rhoades analyzes the effects of corporate headquarter relocations on shareholder wealth. Investors use many factors to derive their perception of a company's stock worth and the price they are willing to pay such as the company's current performance, size of corporation and the number of employees hired/fired within a year, changes in top-level management, expenses, and corporate relocations. This paper examines if a company relocating its corporate headquarters to a different city has a statistically significant effect on the company's stock price, and if so, how soon is an effect seen in the stock value.

Rhoades uses a sample (compiled from Bloomberg press releases) of publicly traded corporations on U.S. stock exchanges that have relocated their corporate headquarters from 2000

to 2012. The sample includes sixty-three corporations that have relocated their headquarters to a different metropolitan area within the same state, a new state, or even outside of the United States; companies that had relocation announcements within the same city were not included in the sample. In order to analyze the market reaction to the corporate headquarter relocation, Rhoades uses the Eventus database via Wharton Research Data Services (WRDS) website. This software provides data on the security price, return, and volume data for NYSE, AMEX, and NASDAQ listed firms.

Rhoades finds that the announcement day of a corporate relocation does not produce any abnormal stock returns for the corporation. However Rhoades observes a positive shock in the stock price of a corporation in the days following the relocation announcement, and a continuation of a trend upwards in the stock price one month post-announcement. In addition, the majority of firms relocating their headquarters between 2000 and 2012 relocated to a new state. It is observed that corporations relocating to a new state experience a greater positive shock in stock price than a corporation relocating to a new metropolitan area within the same state

3. SAMPLE CONSTRUCTION AND DATA ISSUES

In this paper, I assemble data from multiple sources. First, I review internet news sources and research papers available from The American Economic Association's electronic database, EconLit (EBSCO), to identify corporate relocations. I examine moves occurring during the time period 2000 to 2015. My sample includes thirty-four corporations that relocate by exiting/entering a metropolitan statistical area (MSA) or merging with an existing corporation in a new MSA. These corporations include Fortune 1000 and large not-for-profit companies in a wide array of industries: air and automobile manufacturing, hospitality and food & beverage, telecommunications, healthcare, and oil & gas.

Second, for each metropolitan statistical area (MSA) where a headquarter (HQ) event occurs between 2000 and 2015, I identify a comparison MSA. Because of national economic events such as the housing crisis in 2007-2008, a comparison MSA needs to be selected for the same time period as the city experiencing a headquarter event. To do this, I compile data on the population, median household income, unemployment rate, and the percent of the population age twenty-five to sixty-four (i.e. the population of the eligible workforce) from the U.S. Census Bureau,[2] and I select one MSA to match each event MSA. I select the comparison MSA to match the event MSAs based on four metrics compiled from the U.S. Census Bureau: 2010 population, median household income, unemployment rate, and the percent of the population aged twenty-five through sixty-four (the average workforce population in the U.S. according to the U.S. Census Bureau). This information is reported below in Table 1. For example, the MSA of Dallas-

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[2] On February 8, 2017, I downloaded data on metropolitan statistical area (MSA) population, unemployment rates, median household income from the *2010 State and Metropolitan Area Data Book* produced by the U.S. Census Bureau. Rankings on the population of metropolitan statistical areas was compiled from a 2013 U.S. Department of Labor Report: https://www.dol.gov/vets/grants/2013/appendix-g-copy-of-large-metro-areas-2010-census.pdf

Fort Worth, TX is comprised of 6.37 million people, has a median household income of about $54,000, and has an unemployment rate of about five percent. I match an event that occurs in Dallas-Fort Worth-Arlington, TX to the Philadelphia-Wilmington, PA-NJ-DE-MD metropolitan statistical area, comprised of a population of about 5.97 million people, a median household income of about $58,000, and an unemployment rate of 5.8%, over the same time period. Note that I am selecting the comparison MSA metrics based on 2010 U.S. Census data, although the HQ events occur between 2010 and 2015. As can be seen from Table 1, the events occur across the United States in multiple MSAs in different states and regions of the country.

Some metropolitan statistical areas do not have a comparison MSA match. Large metropolitan areas with a population greater than eight million people such as New York City and Los Angeles do not have an ideal comparison metro, other than each other; however both MSAs witness movement of headquarters entering and exiting. In addition, both the New York City and Los Angeles MSAs are so large in population and geographical size that I am unlikely to detect an effect on a single headquarter event on MSA average house prices. Other small town MSAs such as Decatur, Illinois, Peoria, Illinois, and Rocky Mount, North Carolina do not have an ideal comparison MSA based on the above described metrics, so I also exclude these MSAs from the analysis.

Table 1. Characteristics of Comparable Metropolitan Statistical Areas (MSA).

	Sample MSA	State	2010 Population	Median HH Income	Unemployment Rate	% of Population Age 25-64
Event	Houston-The Woodlands-Sugar Land	TX	5,920,416	$ 51,685	4.8%	54.2%
Comp	Miami-Fort Lauderdale	FL	5,564,635	$ 41,943	5.8%	52.3%
Event	Dallas-Fort Worth-Arlington-Plano	TX	6,371,773	$ 54,180	5.1%	55.1%
Comp	Philadelphia-Camden-Wilmington	PA-NJ-DE-	5,965,343	$ 57,831	5.4%	53.1%
	Atlanta-Sandy Springs-Roswell	GA	5,286,728	$ 57,307	6.2%	56.0%
Comp	Phoenix-Mesa-Scottsdale	AZ	4,192,887	$52,957	4.9%	52.4%
Event	San Antonio-New Braunfels	TX	2,142,508	$46,203	4.7%	51.3%
Comp	Kansas City	MO-KS	2,009,342	$53,464	5.7%	54.3%
Event	Chicago-Naperville-Arlington Heights	IL	7,262,718	$ 58,946	6.2%	56.0%
Comp	Boston-Cambridge-Newton	MA-NH	4,552,402	$ 66,870	4.8%	55.2%
Event	Washington-Arlington-Alexandria	DC-VA-MD	5,636,232	$ 81,163	3.8%	69.8%
Comp	San Francisco-Redwood City	CA	4,335,391	$74,560	5.0%	59.5%
HQ	Seattle-Tacoma-Bellevue	WA	3,439,809	$ 61,740	4.8%	57.7%
Comp	Minneapolis-St. Paul-Bloomington	MN	3,348,859	$ 63,866	5.2%	55.7%
HQ	Detroit-Dearborn-Livonia	MI	4,296,250	$ 53,953	9.9%	53.2%
Comp	Riverside-San Bernardino-Ontario	CA	4,224,851	$54,991	8.3%	51.8%

Table 1, Cont. Characteristics of Comparable Metropolitan Statistical Areas (MSA).

	Sample MSA	State	2010 Population	Median HH Income	Unemployment Rate	% of Population Age 25-64
HQ Event	Charlotte-Concord-Gastonia	NC-SC	2,217,012	$ 51,702	6.4%	55.4%
Comp	Indianapolis-Carmel	IN	1,715,459	$52,607	5.1%	45.1%
HQ Event	Bridgeport-Stamford-Norwalk	CT	916,829	$78,353	5.2%	53.3%
Comp	Oxnard-Thousand Oaks-Ventura	CA	823,318	$72,984	6.3%	52.4%
HQ Event	Denver-Aurora-Lakewood	CO	2,543,482	$ 58,039	5.0%	56.5%
Comp	Baltimore-Columbia-Towson	MD	2,710,489	$ 62,524	4.6%	54.3%
HQ Event	Newark-Union	NJ-PA	2,121,076	$ 68,264	5.4%	54.4%
Comp	Oakland-Hayward-Berkeley	CA	2,559,296	$ 70,506	6.2%	55.3%
	Milwaukee-Waukesha-West Allis	WI	1,555,908	$ 51,669	4.8%	53.2%
	Nashville-Davidson-Franklin	TN	1,670,890	$49,979	5.5%	55.5%
	St. Louis	MO-IL	2,787,701	$ 51,713	6.6%	53.5%
	Tampa-St. Petersburg-Clearwater	FL	2,783,243	$45,243	6.5%	52.0%

Note: The MSAs of Milwaukee, Nashville, St. Louis, and Tampa experience a headquarter event during the 2010 through 2016 time period of observation in my sample; however none of the events occur at the same time period which allows the MSAs to serve as comparison MSAs at an additional time period that matches with the comparable city that does experience a headquarter event.
Source: Unemployment Rate, Median Household Income, Percent of Population in the Workforce is gathered from the *2010 State and Metropolitan Area Data Book* produced by the U.S. Census Bureau. U.S. Census Population is compiled from a 2013 U.S. Department of Labor Report.

Third, I download house price indexes (HPI) measuring the average movement of house prices at the metropolitan statistical area (MSA) level for each event and comparison MSA[3]. The HPI is constructed by the Federal Housing Finance Agency (FHFA) as quarterly data from 1975:1 to 2016:3. The FHFA uses a weighted repeat sales methodology based on single-family house prices to measure the average movement of nominal house prices in a city, metropolitan statistical area, and state level. In my sample I select the MSA HPI which measures the quality-adjusted, average movement of house prices in a given metropolitan "all transactions (refinancing and purchasing of residential properties)" index. The FHFA constructs the HPI from a database of over eighty million mortgage transactions on single-family properties that have been purchased or securitized by the Federal National Mortgage Association (Fannie Mae) and Federal Home Loan Mortgage Corporation (Freddie Mac) since January 1975 and the repeat-sales approach of Case and Shiller (1987). The repeat-sales approach estimates quality-constant indexes by using multiple selling prices on single properties over time. An important feature of the repeat-sales approach is that it controls for quality by estimating property-specific appreciation. To construct the repeat-sales indexes, FHFA identifies properties in its database on which two or more loans have been made at different points in time. These repeat-transaction properties include both sales and refinancing as well as two or more prices on the same property needed to estimate the HPI. One limitation of the FHFA database is that it does not contain information on property improvements; thus the HPI is a constant-property index.

In order to identify a possible house price effect from a headquarter relocation, I select data three quarters before the HQ event and five quarters after the event, yielding a total of nine

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[3] I downloaded the house price index (HPI) for the event cities on January 26, 2017 and the HPI data for the comparison MSAs on February 2, 2017 from the Federal Housing Finance Agency (FHFA): https://www.fhfa.gov/DataTools/Downloads/pages/house-price-index.aspx

quarters of HPI data. Each corporation experiences at least two different types of events: (i) an exit from a specific MSA as an existing headquarter or an exit from a specific MSA as a merger/acquisition; (ii) an entrance as a HQ into an MSA or an increase in workforce in an MSA through a merger/acquisition. During the 2000 to 2015 time period, I observe a few corporations, such as Starwood Hotels and Big Brothers Big Sisters International, relocating their headquarters multiple times to different MSAs. I structure the data so that each corporation's HQ event is observed as the fourth data point (as mentioned above, three quarters prior to the event and five quarters after the event) for each specific observation. For example, AT&T moves from San Antonio, Texas to Dallas, Texas in 2008:4 while Mercedes-Benz moves headquarters from Newark, New Jersey to Atlanta, Georgia in 2015:2. Even though these events happen at different points in time during the 2000 to 2015 time period in my sample, each event is observed three quarters prior and five quarters after the event. The comparison MSA I use as a control group for each MSA is analyzed during the corresponding time period. For example, Mercedes-Benz relocates to Atlanta, Georgia in 2015:2 so I observe Mercedes-Benz in my data three quarters prior to the event, beginning in 2014:3. This is illustrated in Figure 2. I compare the Atlanta, Georgia MSA to a control MSA, Phoenix, Arizona. Thus, I observe the house price appreciation rates for Phoenix beginning in 2014:3 in order to compare them to changes in Atlanta house prices where a HQ event occurred.

Figure 2. Structure of Sample Data.
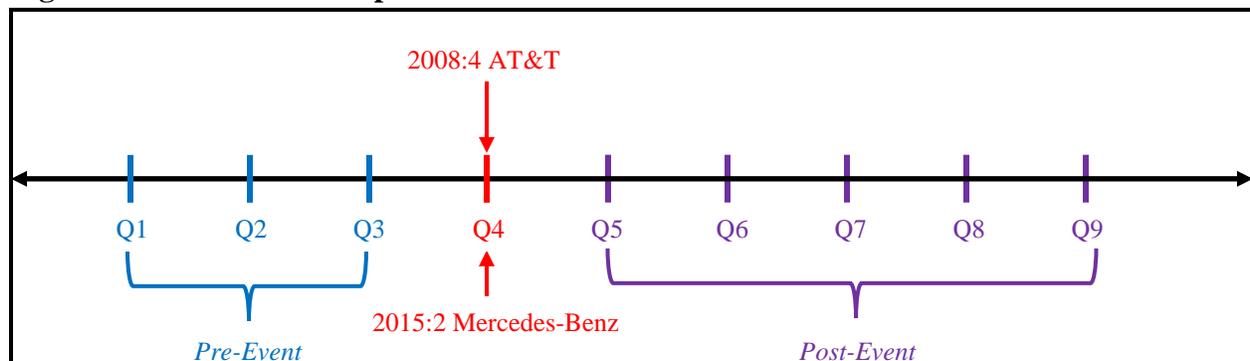
4. EMPIRICAL RESULTS

My first approach at the data is to test if the average appreciation rates of MSAs with HQ events are statistically different than the house price appreciation rates in the control sample. I use the standard formulas, found in Figure 3, to test for statistical significance of the means.

Figure 3. Hypothesis Test of Statistical Significant Appreciation Rates.

H_o: $\mu_1 = \mu_2$
H_a: $\mu_1 \neq \mu_2$

Where: μ_1 = Mean of House Price Appreciation Rates in Sample MSA
μ_2 = Mean of House Price Rates in Control MSA

$$\text{Standard Error} = \sqrt{\frac{\text{Std. Dev.}_1^2 + \text{Std. Dev.}_2^2}{\text{\# of Observations}}} \qquad \text{Test Statistic} = \frac{\text{Mean}_1 - \text{Mean}_2}{\text{Standard Error}}$$

Test Statistic > Critical Value* →
   Fail to Reject Null Hypothesis. Cannot conclude statistical significance.

I used 90% Level of Confidence in my calculations of statistical significance.

In Table 2, I report the summary statistics on the following appreciation rates: event MSA, comparable MSA, and the difference between the event MSA and comparable MSA appreciation rate. MSAs experiencing an event have an average appreciation rate of 0.84%, whereas MSAs not experiencing an event have an average quarterly appreciation rate of 0.78%. I test for statistical significance between the means and find that the average appreciation rate of house prices in MSAs that experience an event is not statistically different from the appreciation rate of house prices in MSAs that do not experience an event.

Table 2. House Price Appreciation Rates Summary Statistics.

	R_HPICOMP	R_HPIMSA	R_HPIDIFF
Mean	0.7797	0.8384	0.0587
Median	1.1120	1.0756	-0.2046
Maximum	9.7254	10.8758	14.8780
Minimum	-14.3028	-9.3044	-9.6714
Std. Dev.	3.2918	2.9907	2.8317
Observations	280	280	280

I also examine average house price appreciation rates by event category: (i) MSA with a headquarter entrance versus comparison group; (ii) MSA with a headquarter exit versus the comparison group. I find that the average house price appreciation rates are not statistically different across the event and nonevent MSA. Next I examine that the average house price appreciation rates for an MSA that witnesses either an exit or entrance of a headquarter is not statistically different than the house price appreciation rate of the control MSA over all time periods.

Table 3 indicates that the average house price appreciation rate across all MSAs that experience a firm exiting as a headquarter is greater than the comparable MSA that does not experience a firm departure. However, the average house price appreciation rates are not statistically different.

Table 3. Corporation Headquarter Events – Exiting an MSA.

	Corporation Name	Event Yr/Qtr	MSA		Event Yr/Qtr Appreciation Rate	
			Exit MSA	*Comparable MSA*	*HPI MSA*	*HPI Comp MSA*
1	Boeing	2001Q2	Seattle, WA	Phoenix, AZ	1.74%	4.35%
2	Comerica Bank	2007Q3	Detroit, MA	San Bernardino, CA	-6.96%	-7.07%
3	MillerCoors	2008Q3	Milwaukee, WI	Nashville, TN	-1.11%	-0.81%
4	AT&T	2008Q4	San Antonio, TX	Kansas City, MO	-4.45%	-2.14%
5	First Data	2009Q3	Denver, CO	Baltimore, MD	0.74%	1.78%
6	Top Golf	2012Q3	Chicago, IL	Boston, MA	1.89%	0.33%
7	Fiesta Restaurants	2012Q4	Miami, FL	Houston, TX	4.19%	1.56%
8	Pulte Group	2013Q2	Detroit, MI	San Bernardino, CA	8.37%	7.45%
9	Sealed Air Corp.	2014Q3	Newark, NJ	Oakland, CA	-0.58%	0.36%
10	Big Brothers Big Sisters	2015Q1	Dallas, TX	Philadelphia, PA	3.99%	0.43%
11	Mercedes-Benz	2015Q2	Newark, NJ	Oakland, CA	3.67%	3.80%
	Average House Price Appreciation Rate				1.04%	0.91%

Source: HQ Event data are collected by author based on news accounts; comparable cities are chosen based on four metrics from the 2010 U.S. Census: population, median house price, unemployment rate, and percent of population aged twenty-six to sixty-four; house price appreciation rates are computed by the author using the FHFA HPI index.

Table 4 includes sixteen observations of a corporation's headquarters impacting a specific MSA through a relocation entrance. I see that the average house price appreciation rate across all MSAs is greater in a MSA that receives a firm's headquarters than the comparable MSA that does not experience an event in the same time period. This observation is likely caused by the headquarter relocation creating a demand for residential properties within a specific MSA at the time of entrance. When demand increases, the short-run house prices increase. This is the effect I expect from a positive relocation event. House prices remain higher until quantity supplied adjusts to accommodate the higher housing demand. I conduct a statistical test for the difference in means and find that although the average quarterly house price appreciation rate appears to be substantially higher, the variance is high and the difference in means is thus not statistically significant.

Table 4. Corporation Headquarter Events – Entering a new MSA.

	Corporation Name	Event Yr/Qtr	MSA		Event Yr/Qtr Appreciation Rate	
			Entry MSA	*Comparable MSA*	*HPI MSA*	*HPI Comp MSA*
1	Boeing	2001Q2	Chicago, IL	Boston, MA	2.93%	4.78%
2	Hardee's	2001Q2	St. Louis, MO	Tampa, FL	3.76%	2.56%
3	Nissan	2005Q3	Nashville, TN	Milwaukee, WI	1.58%	2.02%
4	Comerica Bank	2007Q3	Dallas, TX	Philadelphia, PA	-0.74%	-0.19%
5	MillerCoors	2008Q3	Chicago, IL	Boston, MA	-3.88%	-2.63%
6	AT&T	2008Q4	Dallas, TX	Philadelphia, PA	-1.53%	-1.76%
7	DaVita Inc.	2009Q2	Denver, CO	Baltimore, MD	4.16%	-1.24%
8	First Data	2009Q3	Atlanta, GA	Phoenix, AZ	4.31%	-0.08%
9	Northrop Grumman	2010Q3	Washington, DC	San Francisco, CA	-1.60%	-2.47%
10	Starwood Hotels	2012Q1	Bridgeport, CT	Ventura, CA	3.59%	1.14%
11	Fiesta Restaurants	2012Q4	Dallas, TX	Philadelphia, PA	1.55%	2.97%
12	Pulte Group	2013Q2	Atlanta, GA	Phoenix, AZ	2.67%	3.37%
13	Archer Daniels Midland	2014Q3	Chicago, IL	Boston, MA	1.25%	0.72%
14	Sealed Air Corp.	2014Q3	Charlotte, NC	Indianapolis, IN	-1.21%	0.93%
15	Occidental Petroleum	2014Q4	Houston, TX	Miami, FL	2.07%	0.80%
16	Mercedes-Benz	2015Q2	Atlanta, GA	Phoenix, AZ	5.14%	3.31%
	Average House Price Appreciation Rate				1.50%	0.89%

Source: HQ Event data are collected by author based on news accounts; comparable cities are chosen based on four metrics from the 2010 U.S. Census: population, median house price, unemployment rate, and percent of population aged twenty-six to sixty-four; house price appreciation rates are computed by the author using the FHFA HPI index.

As indicated in Table 5, the average house price appreciation rate across all MSAs that experience a firm exiting as a headquarter and merging with an existing firm, the MSA that experiences the exit experiences a lower house price appreciation rate on average compared to the control MSA. However when the firm enters the MSA and employees join the existing workforce the control MSA that experiences no event has a higher appreciation rate, despite being a negative appreciation rate on average. Since the sample size is very small, I do not test for statistical differences in the means.

Table 5. Corporation Headquarter Events – Mergers & Acquisitions

	Corporation Name	Yr/Qtr	MSA		Appreciation Rate	
			Event MSA	*Comparable MSA*	*HPI MSA*	*HPI Comp MSA*
1	Nextel*	2005Q3	Washington, DC	San Francisco, CA	4.07%	6.48%
2	Nextel	2005Q3	Kansas City, MO	San Antonio, TX	0.09%	1.50%
3	Continental Airlines*	2010Q4	Houston, TX	Miami, FL	-1.87%	-2.33%
4	Continental Airlines	2010Q4	Chicago, IL	Boston, MA	-4.36%	-2.32%
5	XM Radio*	2011Q1	Washington, DC	San Francisco, CA	-1.17%	-3.15%
6	Teavana*	2012Q4	Atlanta, GA	Phoenix, AZ	0.61%	3.17%
7	Teavana	2012Q4	Seattle, WA	Minneapolis, MN	2.60%	0.34%
8	Gentiva Health Services*	2014Q3	Atlanta, GA	Phoenix, AZ	0.45%	0.03%
	Average House Price Appreciation Rate – Exit as a HQ & Merge				0.42%	0.84%
	Average House Price Appreciation Rate – Enter with existing workforce				-0.56%	-0.16%

Note: * denotes a corporation's headquarter exiting a MSA and merging with an existing corporation

Source: HQ Event data are collected by author based on news accounts; comparable cities are chosen based on four metrics from the 2010 U.S. Census: population, median house price, unemployment rate, and percent of population aged twenty-six to sixty-four; house price appreciation rates are computed by the author using the FHFA HPI index.

5. ECONOMETRICS MODEL

In my econometric model I use difference-in-differences estimation to capture the impacts of a corporation's headquarter relocation on house prices in a specific MSA at a specific point in time.

I estimate the following specification for MSA j at time t:

Model 1: $\quad R\_hpidiff = \alpha + \beta eventd_j + \varepsilon_j$

where $R\_hpidiff$ is the difference in appreciation rates between the event MSAs and the comparable MSAs. The time period includes nine quarters: three quarters prior to an event and five quarters after the event. $Eventd_j$ is the difference-in-differences estimator that measures the impact of the relocation on the house price appreciation rate in the MSA that experiences an event relative to the MSA that does not experience an event. $Eventd_j$ is an indicator variable that is equal to 1 in the event year and quarter of the event for MSAs experiencing an event, and 0 otherwise. Table 6 reports the regression results for the full sample and by event type. I see that none of the coefficient estimates are statistically significant at the ninety percent level of confidence. Thus I cannot confidently conclude that there is an impact of the headquarter relocation events on house price appreciation rates within an event's respectable MSA. I also generate a ninety percent confidence interval to determine if the interval includes zero, and I find that the confidence interval *does* include zero. Therefore I cannot reject that there is not an impact of these events on house prices.

Table 6. Model 1: Impact of the HQ Relocation on Appreciation Rates by Event Type.

	Coefficient	Std. Error	T-stat	Prob.	CI @ 90%
Entrance	0.614	0.578	1.063	0.290	(-0.889, 1.007)
Exit	0.135	0.949	0.142	0.889	(-1.530, 1.582)
Positive Event	0.455	0.516	0.882	0.379	(-0.935, 0.757)
Negative Event	-0.039	0.851	-0.045	0.964	(-1.162, 1.630)
FULL MODEL	0.229	0.479	0.479	0.632	(-0.729, 0.844)

I rerun Model 1 to account for the impact of the housing crisis and recessionary years by narrowing the sample to events that occur within an MSA after 2011. Table 7 reports these statistics. I again conclude that the coefficients are not statistically significant.

Table 7. Model 1: Post-Recession Recovery (Year > 2011).

	Coefficient	St. Error	t-stat	Prob.	Stat. Sig?
Entrance	0.259	0.796	0.325	0.746	No
Exit	1.270	1.288	0.986	0.329	No
Positive Event	0.509	0.715	0.713	0.479	No
Negative Event	0.685	1.032	0.664	0.509	No

Next I estimate a model, Model 2, that pools all events and has an interaction term to control for event type:

$$R\_hpidiff = \alpha + \beta_1 eventd_j + \beta_2 Goodevent_j + \beta_3 eventd_j * Goodevent_j + \varepsilon_t$$

where *Goodevent* represents an indicator variable that is equal to 1 if the event is positive (an entrance into an MSA or merger with an existing firm's workforce) and 0 if the event is negative (an exit from an MSA). The effect of the headquarter relocation event varying by the event type is represented in the interaction term, $\beta_3 eventd_j * Goodevent_j$. If the event is a negative event the effect of the event will be represented in β_1. As reported in Table 8, the coefficient of β_1 is -0.038 which indicates a negative effect on a MSA when a firm's headquarter exits. I also find a negative coefficient value of -0.167 for β_2 which implies a negative impact on a MSA when a firm's headquarters enters the MSA. However I find that these coefficient estimates are not statistically significant at the ninety percent level of confidence. Thus I cannot confidently conclude that there is an impact. I also generate a ninety percent confidence interval to determine if the interval includes zero, and I conclude that I cannot reject that there is not an impact of these events on house prices.

Table 8. Model 2: Pooling All Event Types With An Interaction Term.

	Coefficient	Std. Error	t-stat	Prob.	CI @ 90%
$Eventd_j$	-0.0386	0.7094	-0.0544	0.9566	(-1.1047, 1.2221)
$Goodevent_j$	-0.1664	0.2461	-0.6761	0.4996	(-.76064, .87804)
$Eventd_j * Goodevent_j$	0.6596	0.9938	0.6637	0.5074	(-1.5711, 1.6885)

By using the "Adjusted R^2" and F-statistic test, I conclude that Model 2 fits the data best. Model 1 has an Adjusted R^2 value of 0.00039; this means that 0.039% of the movement in the difference in house price appreciation rates can be explained by the headquarter relocation occurring in a specific year and quarter. Model 1 explains very little variation in the difference in house price appreciation rates between the event MSA and control MSA. Model 2 has an Adjusted R^2 value of -0.004219. The "R^2" is 0.002979 which also indicates that this model does not fit the data very well. I conduct an F-test on the restricted model (Model 1) versus the full model (Model 2), as shown in Figure 4. My calculation finds that the F-statistic of 0.3584 is less than the F-statistic critical level of significance, 3.0718. Thus I conclude that the betas are not jointly statistically significant, i.e. the variables impact the regression model on the difference in house price appreciation rates.

Figure 4. Hypothesis Test of Statistical Significant Appreciation Rates.

H_o: $\beta_1 = \beta_2 = \beta_3 = 0$ → Jointly Statistically Significant
H_a: Not Jointly Statistically Significant

$$F - statistic = \frac{(SSE_R - SSE_F)/(DF_R - DF_F)}{SSE_F/DF_F}$$

where Degrees of Freedom = Sample Size – (# of Regressors – 1)
SSE = Sum of Squared Errors
5% Level of Significance = 3.0718

F-statistic > F-statistic Critical Level of Significance →
Reject the Null. $\beta_1 = \beta_2 = \beta_3 = 0$ → Jointly Statistically Significant.

I further enhance Model 2 by adding an indicator variable to control for large MSAs, those having a population greater than four million people, and the housing crisis from 2007 - 2009. I add an indicator to control for large MSAs to determine if house prices vary by metropolitan size. A positive and statistically significant coefficient would indicate that on average large MSAs have higher house price effects from a corporation move. The coefficient is statistically insignificant however. The control for recession years suggests that cities with a corporate event fared better during the recession than their comparison cities.

Table 9. Model 2: Controlling for Population and Recession in MSAs

	Coefficient	Std. Error	t-stat	Prob.
$Eventd_j$	-0.4330	0.7241	-0.5980	0.5503
$Goodevent_j$	-0.5752	0.3120	-1.8435	0.0663
$Eventd_j * Goodevent_j$	1.0063	0.9988	1.0075	0.3146
MSA_Large	0.3928	0.2890	1.3589	0.1753
Recession	0.7920	0.3945	2.0079	0.0456

Including the large MSA and recession controls changes the statistical significance on the difference-in-differences estimator. The effect of *Eventd* varies by whether or not it is a *Goodevent*. Computing the marginal effect of a positive corporate relocation yields:

$$\frac{\delta HPIdiff}{\delta Goodevent} = (-0.5752) + 1.0063 * (Eventd = 1)$$

For the cities experiencing a positive event, the house price appreciation rate is 0.43 percentage points higher in the event year and quarter than house price appreciation rates in the comparable MSA.

6. CONCLUSION

Local economies are effected by the presence of a corporation as its presence brings employees spreading wealth and boosting the economy. Corporations are lured to relocate their headquarters by many factors such as tax subsidies from local governments, work-life balance in the central business district (CBD), public transportation, and cost of living. Moving headquarters often can be a way for companies to evolve their brands and attract a younger workforce. Corporate headquarter relocations may impact the local economy either through a decrease in the workforce or migration of employees to an MSA. House prices in an MSA can fall or rise when a corporation exits or enters; thus, the local economy either suffers or benefits. In my research I suspect there is high demand for residential real estate in the quarter of a firm relocation and excess supply of residential properties when a firm exits an MSA.

My research concludes that on average house prices are greater in MSAs experiencing an exit or entrance of a firm than a comparable city that does not witness a headquarter event during the 2000 to 2015 time period of observation. I expect an impact of a headquarter relocation event on house prices but in most of the models I estimate I do not detect an effect at the MSA level; this may be due to a small sample size. An effect may exist but I cannot precisely estimate it. Alternatively this may be due to the lack of an effect on city-wide house prices from a corporate relocation event. In the full model controlling for MSA size and recessionary years, I do find a small positive impact of a corporation entering an MSA.

Corporate headquarter relocations can have a multiplier effect on the economy as employment and wages are expected to increase, and demand for residential and commercial real estate rises. In Enrico Moretti's book, *The New Geography of Jobs*, he asserts that "a healthy traded sector benefits the local economy directly, as it generates well-paid jobs, and indirectly as

it creates additional jobs in the non-traded sector. What is truly remarkable is that this indirect effect on the local economy is much larger than the direct effect." When MSAs are able to attract diversity within multiple industries, the local economy is less vulnerable to corporations entering and exiting a specific MSA. It is beneficial for local governments to attract corporations with highly skilled employees as the job market for less-skilled workers also benefits.

When corporations relocate their headquarters, they make a powerful statement about the business climate of both the MSA the firm leaves and enters. A multiplier effect can be seen by multiple corporations exiting the same MSA and MSAs attracting multiple firms. A city's "attractiveness" make other companies want to establish a presence in the same region. For example, Kraft Heinz established its headquarters in Chicago. As reported in *Chicago Business* ConAgra, a rival food company, followed suit in 2016 to compete with Kraft Heinz for market and employment share. When Boeing moved its headquarters to Chicago in 2001, Seattle's economy rebounded because of its strong, diverse economy with the presence of Starbucks, Amazon, and Microsoft.

With further research and a microeconomic view on house price impacts of corporate headquarter relocations, I expect a sub-city, zip-code effect of corporate headquarter relocations. With the growing trend of millennials wanting a work-life balance, corporations are either moving their headquarters from the suburbs to the central business district or to a new region. The local economy can benefit as real estate developers charge premiums on rent and build new communities. Corporate headquarter relocations create jobs for residents and the tax revenue into the city can be reinvested into improving neighborhoods. My research is beneficial to local governments to attract and retain headquarters within their respective MSA in order to provide growth and economic prosperity.

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