Section 1.0 – Introduction

Real Estate markets are one of the major indicators of how an economy (micro or macro) is performing. Nearly 5.8 million houses were sold in the US in May 2021 alone, which is a tremendous increase of over 44% from the previous year. Real Estate is considered one of the most stable markets in the US as it is one of the least liquifiable asset class. It is a fixed income asset class which provides reliable income for many investors which is why there is a sense of trust among people when purchasing real estate. This trust can depend on a lot of factors such as Government Policies (monetary and fiscal policy), Prospects of FDI (Foreign Direct Investment), DII (Domestic Institutional Investment), etc. When people are willing to invest/buy real estate, it means there has been (or is going on) an increase in savings, earnings, and income of households in a particular geographical/political area.

In the past two years, the pandemic has caused a lot of people to spend smaller portions of their income and save more. In this paper, I will look at whether Atlanta's real estate market is doing any differently than other major US Cities. If it is, what are some of the factors that are affecting it? My hypothesis is that due to multiple factors like migration, income, unemployment, government regulations, Covid-19 impacted Atlanta's real estate in a positive way compared to other US Cities. I will look at the data from the Bureau of Labor Statistics, and the US Census Bureau to compare the impact of Covid-19 on Atlanta with other major US Cities.

Section 2.0 – Background

Since the beginning of the pandemic in the US in March 2020, a lot of things have changed. Our day-to-day lives changed in many ways with worldwide lockdowns, travel bans, and stay at home orders. According to the National Academy for Health State Health Policy, between March 1 and May 31 of 2020, 71% of all US counties issued mandatory stay at home orders. This was around the same time when infections worldwide were multiplying by huge factors and was also known as the original or alpha wave. Stay at home

Table 5 and Table 6 show the unemployment rate in all the metros for all financial

quarters from 2019Q1 to 2021Q4, and the net percent change in during those quarters. The

highest unemployment rate was during the 2020Q2 when the pandemic was at its peak.

Although, the infections, deaths, and hospitalizations due to covid peaked at other times than

2020Q2, the main reason for the unemployment being significantly higher then was because of

the uncertainty about the future. Scientists, Doctors, and Data Scientists had very limited data to

work with hence there were heavy government regulation in terms of mask mandates, stay at

home orders, etc. In all the other of the cities, the unemployment was between 23.3-109.5%

higher than 2019Q4. This indicates that metros other than Atlanta have not yet fully recovered

from Covid-19's economic impact on the country.

Section 3.3 – Median Household Incomes

Median household income data is collected in a time series format for each of the

counties. The total percent change is then calculated from the first data point to the last one.

Additionally, I calculate annual percent change from 2011 to 2020. At the time of data

collection, median incomes for 2021 are not available. For each city, the data is averaged out

using the weighted average method in which the 'population' is used as the factor deciding the

weight of individual counties.

$$= \beta_0 + \beta_1 \qquad + \beta_2 \qquad + \beta_3$$

$$+ \beta_4 \qquad \text{"Metro"} + \beta_5 * X_{it} + \beta_6 * \text{Time} + \beta_7 * \text{"} \qquad \text{"} +$$

This equation controls for whether the house in downtown area, whether the house was listed in post-Covid era (March 2020 or later), whether a house in a specific city, and the following additional variables: Unemployment Rate, Population, Median Household Income, Median House size (sqft), and Labor Force Participation. These variables are directly or indirectly related to the housing prices. For example, the higher the unemployment rate, the lower the prices as people won't be willing to pay higher prices for houses. Higher populations may increase the demand for housing, and impact prices. Similarly, the higher the income, the more people are willing to spend on housing. Hence, inclusion of these factors is important in this paper.

The dataset compiled for these linear models consisted of a combination of the following variables: House size, Downtown, Post-Covid, the interaction between Downtown and Post-Covid, control variables for each of the metros, control variables for the interaction between post-covid and each of the metro, Unemployment Rate, Labor Force Participation, and Median Household Income. Table 9 lists summary statistics for the sample used in this analysis.

The results of my linear regression model are presented in Table 10. I ran a total of 3

statistically significant for all three specifications. An additional square foot of space reduces listing prices by $105 to $110. One potential explanation for this is that larger homes require more energy which results in higher utility bills. Sellers may be lowering prices to offset increases in utility bills. According to the first linear model, a house in downtown would cost $120,000 more than a house in suburban Atlanta. Similarly, a house would cost $47,670 more in a post-covid period. In column 2, I add an interaction of the indicators for post-covid and downtown homes. The coefficients for a downtown house and the post-covid house don't change significantly, but a house in downtown and post covid era would cost an additional $7,652 compared to Suburban Atlanta, however the result is not statistically significant. Therefore, downtown area didn't have statistically significant price hikes in residential real estate compared to Suburban Atlanta following the start of the Covid-19 pandemic. In column 3 of Table 10 all the metros were interacted with the post covid indicator variable. The coefficients of these interactions represent the change in listing prices metro area compared to Atlanta after the start of the Covid-19 pandemic. The cities which showed similar trends with Atlanta with respect to unemployment rate, population growth a were also the cities which had lower house cost compared to suburban Atlanta. The rest of the cities had higher cost of houses than suburban Atlanta and were statistically significant, except for Boston. After the start of Covid-19 pandemic, prices of houses in New York City were $75,890 more than houses in Suburban Atlanta, ceteris paribus. In Chicago, houses were $40,890 more than Suburban Atlanta, ceteris

that Atlanta had a very lenient regulation on Covid-19 compared to other metros. I think this could be the reason why the results differ for these cities. Going forward, it will be interesting to look at the actual data of strictness levels of governments to deal with Covid, severity of the cases, and the number of cases in these cities.

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Figures and Tables
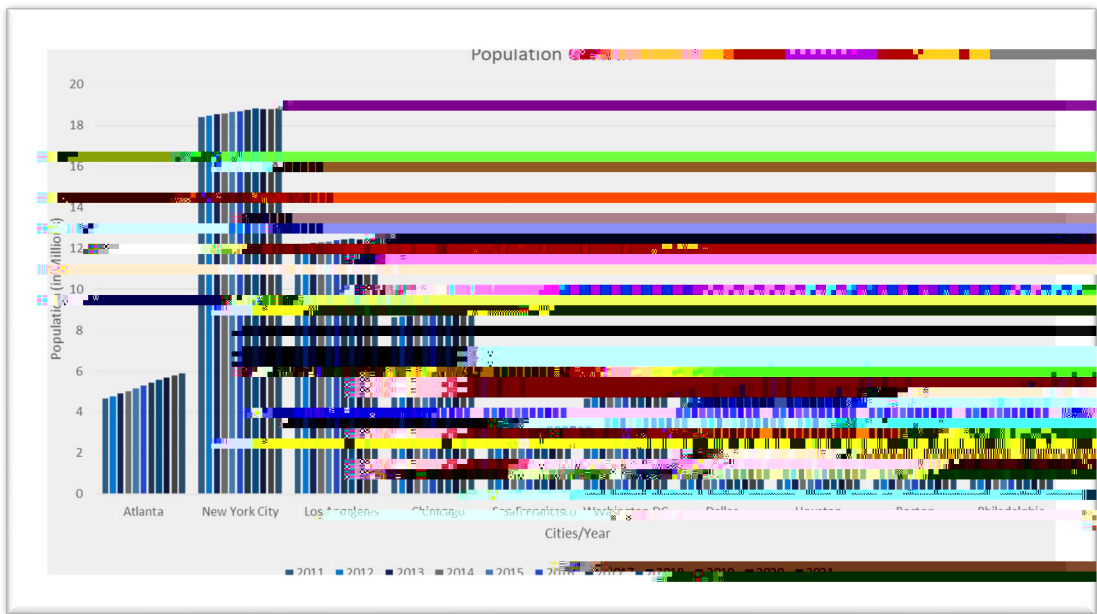
Figure 1: Annual Population Growth
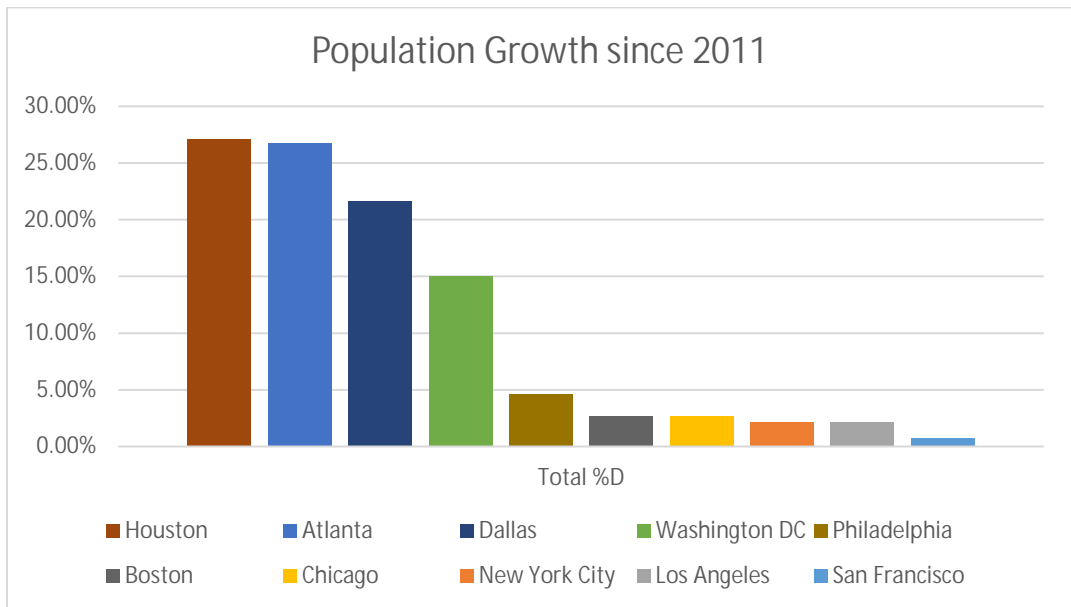
Figure 2: Population Growth Since 2011
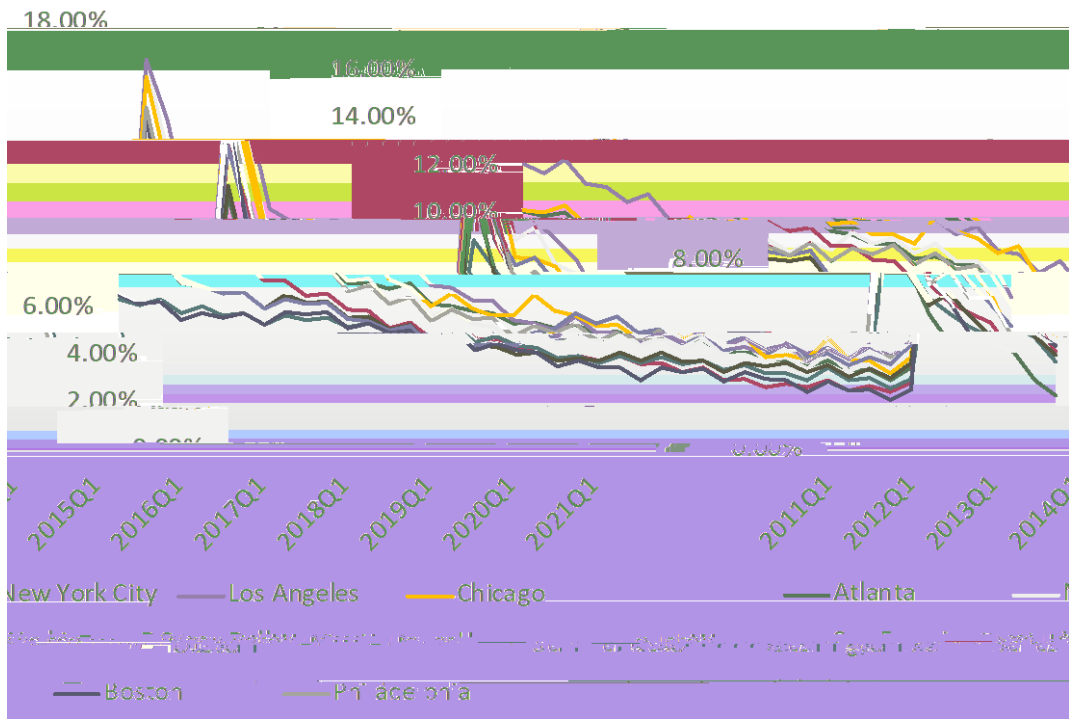
Figure 3: Unemployment Rate by Metropolitan Area

	Atlanta	New York City	Los Angeles	Chicago	San Francisco	Washington DC	Dallas	Houston	Boston	Philadelphia
2019	2.10%	-0.07%	-0.08%	-0.02%	-0.21%	1.09%	1.67%	2.13%	-0.02%	0.18%
2020	2.00%	-0.01%	-0.01%	0.03%	-0.12%	1.10%	1.61%	2.02%	0.05%	0.21%
2021	1.86%	0.10%	0.10%	0.14%	-0.03%	1.05%	1.52%	1.88%	0.14%	0.30%
Avg										

Table 2, State Income Tax Rates in 2022

	Lowest Earners	Highest Earners
California	1.00	13.30
Delaware	2.20	6.60
Georgia	1.00	5.75
Illinois	4.95	4.95
Maryland	2.00	5.75
Massachusets	5.00	5.00
New Jersey	1.40	10.75
New York	4.00	10.90
Pennsylvania	3.07	3.07
Texas	0.00	0.00
Virginia	2.00	5.75
Washington DC	4.00	10.75
West Virginia	3.00	6.50

Notes: 2022 state income tax rates pulled from https://taxfoundation.org/state-income-tax-rates-2022/

10.90

Table 5, Quarterly Unemployment Rate from 2019Q1 to 2021Q4 (At4265 3 (t)6 (R)1a (2) R0(t)0y0(t265 3 R)1a ((

	Atlanta	Boston	Chicago	Dallas	Houston
2019Q1	3.80%	2.90%	4.73%	3.57%	4.07%
2019Q2	3.37%	2.53%	3.83%	3.10%	3.57%
2019Q3	3.40%	2.57%	3.77%	3.43%	3.93%
2019Q4	2.93%	2.10%	3.27%	3.03%	3.63%
2020Q1	3.47%	2.57%	3.93%	3.70%	4.47%
2020Q2	10.73%	14.17%	15.73%	11.23%	12.87%
2020Q3	7.70%	8.97%	11.97%	7.43%	9.53%
2020Q4	5.73%	7.27%	8.20%	6.13%	7.83%
2021Q1	4.57%	6.30%	8.13%	6.60%	8.20%
2021Q2	4.13%	4.90%	7.80%	5.70%	7.10%
2021Q3	2.93%	4.97%	6.63%	4.80%	6.17%
2021Q4	2.30%	4.40%	4.80%	4.05%	5.25%
Percent Change after 2019Q4	-21.59%	109.52%	46.94%	33.52%	44.50%
Change after 2019Q4	-0.63%	2.30%	1.53%	1.02%	1.62%

Table 9, Summary Statistics Table

Variables	N	Mean	Std Dev
House Price	4644	473128.134	282271.481
Downtown	4644	0.116	0.321
Post-Covid	4644	0.185	0.388
Downtown * Post-Covid	4644	0.022	0.145
New York City	4644	0.081	0.273
Chicago	4644	0.105	0.306
Los Angeles	4644	0.058	0.234
San Francisco	4644	0.151	0.358
Washington DC	4644	0.163	0.369
Dallas	4644	0.081	0.273
Houston	4644	0.023	0.151
Boston	4644	0.081	0.273
Philadelphia	4644	0.128	0.334
House Size sqft	4644	2080.35	489.692
Unemployment Rate	4644	4.947	2.881
Population	4644	845414.288	1296308.443
Labor Force Participation	4644	63.314	2.391
Median Household Income	4644	83164.234	20832.108

	Linear Model 1	Linear Model 2	Linear Model 3
	1,164,000.00	1,163,000.00	1,228,000.00
	(81,140.00)	(81,190.00)	(81,910.00)
	-105.7***	-105.5***	-110.50***
	(6.98)	(7.00)	(7.01)
	-10,220***	-10,280***	-12,590***
	(1,137.00)	(1,144.00)	(1,215.00)
	0.01061***	0.01061***	0.01***
	(0.00)	(0.00)	(0)
	-16,820***	-16,790***	-17,200***
	(1,194.00)	(1,195.00)	(1,202.00)
	-1,088***	-1,089***	-1,170***
	(180.50)	(180.50)	(179.80)
	120,000***	118,600***	
	(8,175.00)	(8,657.00)	(8,631.00)
	47,670***	47,190***	21000.00
	(10,180.00)	(10,230.00)	(16,330.00)
		7,652.00	5,750.00
		(16,170.00)	(16,330.00)
	8.135***	8.129***	8.10***
	(0.15)	(0.15)	(0.15)
	93,310***	93,640***	75,390***
	(12,900.00)	(12,920.00)	(13,560.00)
Chicago	-103,400***	-103,300***	-110,900***
	(9,310.00)	(9,314.00)	(10,080.00)
	195,300***	195,500***	171,000***
	(13,160.00)	(13,170.00)	(13,980.00)
	309,100***	309,400***	295,600***
	(10,740.00)	(10,760.00)	(11,330.00)

Table 10 con'td, Linear Regression Table			
Washington DC	-32,050***	-31,960***	-32,330***
	(9,110.00)	(9,113.00)	(9,704.00)
Dallas	-26,150**	-26,170**	-24,080*
	(9,037.00)	(9,038.00)	(9,923.00)
Houston	(13,520.00)	(13,390.00)	(10,730.00)
	14,590.00	14,590.00	15,960.00
Boston	64,310***	64,420***	55,730***
	10,210.00	10,210.00	11,060.00
Philadelphia	-117,300***	-117,100***	-136,900***
	9,272.00	9,244.00	10,090.00
New York * Post Covid			75,890**
			23,930.00
Chicago * Post Covid			40,890.00
			21,430.00
Los Angeles* Post Covid			122,600***
			25,940.00
San Francisco * Post Covid			63,260**
			19,610.00
Washington Dc * Post Covid			(5,023.00)
			19,120.00
Dallas * Post Covid			(17,670.00)
			22,970.00
Houston * Post Covid			(4,710.00)
			36,530.00
Boston * Post Covid			31,000.00
			23,390.00
Philadelphia * Post Covid			97,610***
			20,480.00
Sample Size	4644	4644	4644
R^2	0.7685	0.7685	0.7718
Notes: Numbers in parenthesis are the standard errors			
*** 99.9%, ** 99%, * 95%, . 90%,			

Table 11, List of Counties									
Atlanta	Boston	Chicago	Dallas	Houston	Los Angeles	New York City	Philadelphia	San Francisco	Washington DC
Fulton	Norfolk	Cook	Collin	Austin	Los Angeles	New York	Burlington	Alameda	DC
Forsyth	Plymouth	DeKalb	Dallas	Brazoria	Orange	Kings	Camden	Contra Costa	Calvert
Cobb	Suffolk	DuPage	Denton	Chambers	Ventura	Queens	Gloucester	Marin	Charles
Clayton	Essex	Grundy	Ellis	Fort Bend	Riverside	Bronx	Bucks	San Francisco	Frederick
Cherokee	Middlesex	Kankakee	Hunt	Galveston	San Bernardino	Richmond	Chester	San Mateo	Montgomery
Gwinnett	Rockingham	Kane	Kaufman	Harris		Hudson	Montgomery	San Benito	Prince George's
Dekalb	Strafford	Kendall	Rockwall	Liberty		Bergen	Delaware	Santa Clara	Arlington
Rockdale		McHenry		Montgomery			Philadelphia	Napa	Clarke
Henry		Will		Waller			New Castle	Solano	Culpeper
Fayette							Cecil	Sonoma	Fairfax
Douglas							Salem	Merced	Fauquier
								Santa Cruz	Loudoun
								San Joaquin	Prince William
								Stanislaus	Rappahannock
									Spotsylvania
									Stafford
									Warren
									Jefferson