Remote Mania: A Cost/Reward Analysis of Software Companies Moving to Remote

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***Abstract* - The recent COVID pandemic forced many companies to shift their focus and thinking into truly trying to understand how work within their organization was accomplished. The traditional model of coming into the office to work has been coming under scrutiny as many employees, as well as some employers, advocate for working remotely at home. The software industry, in particularly, has been a massive proponent of this movement as they are able to complete most of their work digitally. The focus of my research was, in essence - what are the effects of software companies moving to remote from both a developer and managerial perspective? Throughout this research, there was sufficient evidence to conclude that with rising office costs, higher employee productivity and a higher natural ability for software professionals to work remotely, that remote work is a net positive for software professionals.**

Keywords & Taglines*: Remote Work, Software Industry, COVID, Workplace Effects, Hadoop MapReduce, Hadoop Hive, Data Visualization*

I. INTRODUCTION

Historically, the idea of remote work never really was considered as a tangible possibility for full-time employment until recently when the COVID pandemic ravaged the world. With the pandemic raging on for nearly 3 years as of winter 2021, the very idea of work has come under scrutiny as to whether it is even necessary to come into an office to get work done. Today, it seems that every other headline discussed this 'Great Migration' of office workers moving remote to limit the spread of COVID, but now the narrative has changed into one that promotes remote work as an overall better solution to office work. On one corner we have employees who point to feeling more productivity and happier working remotely while, on the other hand, we have their managers who point out a lack of collaboration, teamwork, and oversight as a problem with remote work.

This research aims to contextualize both sides of the argument to truly clear the air of the benefits (or lack) of remote work. The end goal of this research is to inform future software developers, current software developers, and company stakeholders, with a full holistic view of remote work in the software industry to better inform their decisions on being an advocate or opponent of remote work. This new view will consider potential working benefits, such as productivity, as well as from the financial perspective, specifically around office sale prices.

To form this holistic view, I decided to find, clean, and then analyze a variety of open-source datasets that ultimately would draw conclusions to understand if the

software industry benefits overall from remote work. My analysis was conducted using the Hadoop Ecosystem where the File System (HDFS) stored the raw data and then was cleaned/profiled using traditional MapReduce jobs. After all data was cleaned, I would then transfer that clean data into Hive tables for final analysis using Hive SQL commands. Below is an overview of the general flow of data in my analysis:

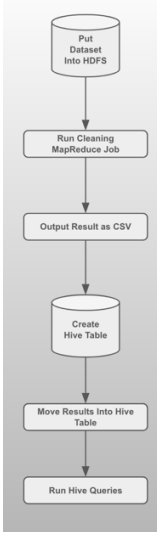

Figure 1: Showing an overview of the flow of data in this research

An important note with my data flow architecture is that I made it a very prominent point to not overcomplicate the architecture for the sake of appearing 'scientific' and wanted to keep this flow as simple and straightforward as possible, which I believe I accomplished very well, demonstrated by my end results.

II. MOTIVATION

The drive to analyze remote work really came from two critical areas: browsing through currently available remote work research and everyday obsessive discussion over remote work.

In particular, the most prominent motivation for this analysis was the seemingly consistent discussion over remote work. In the software industry, nearly every discussion around new hires today is governed by the flexibility of remote work while remote work has been considered the ultimate job acceptance factor there is today, particularly for software developers. In merely 2 years, remote work demand has been increased by 460% as of the summer of 2021 [4]. With remote work on the discussion board of both every company and the job checklist of job seekers, it appeared imperative to analyze the benefits of remote work.

A lack of a 'dual-perspective' on remote work being absent was also a large factor in this analysis. While it is true much research has been done on remote work in recent years, this research is usually skewing in a singular direction to either the developers' perspective or the managers', but rarely bidirectional. This will be discussed in more detail shortly, but the underlying idea is that with these isolated studies, getting a fully platonic understanding of remote work is near impossible. A good analogy would be trying to understand the benefits of going to university when one research focuses on the financial strain, another on the networking opportunities, and another on the cafeteria food. While each study increases the natural understanding of going to college, only when they are shown in aggregate would it then be possible to draw any sort of conclusion. In other words, you need to understand all the pieces in order to solve the puzzle.

The biggest motivation push for me personally was also the simple fact that I too am a developer. As a graduating NYU student with a degree in Computer Science, I am quite likely looking at a software engineering job out of college and will certainly be caught in this storm of remote work. Rather than jumping into this industry head on without any sort of understanding of this rather monumental workplace

adjustment, I would greatly benefit from at least somewhat understanding the pros and cons of working remotely to form my own opinion. I really do hope that other software developers have similar mindsets like my own and are eager to learn more about if remote work is truly the future for software.

III. Related Work

It was discussed earlier that the overwhelmingly majority of remote work research focuses on individual pieces of the overall picture. An important note to this, however, is that this is of no fault of the researchers with a bias, or a narrow-mindlessness when conducting these results, but instead is largely due to different questions being asked for different goals than the question I am answering – which is quite typical in data analytics and research.

One of the more in-depth studies on remote work was conducted by Owl Labs who conducted a massive survey of over 1,200 full time workers to gauge the extent of remote work. Their findings were revolving almost exclusively around the employee working remotely rather than from any sort of financial perspective of the managers'. The employee survey concluded that 83% of respondents felt working remotely made them happier, 80% feeling it was decreasing stress, 79% expressing better focus, and many other conclusions that side with the employees advocating for remote work [1]. More credit, however, should be given as Owl Labs did do a 'sub-study' for managers, asking them what their concerns were with remote work, with the top 3 results being reduced employee productivity, reduced focus, and lack of engagement, with the percent of managers agreeing at 82%, 82%, and 81%, respectively. While this did consider the often-missed managers' concerns, a survey asking them their worries, rather than by what they see day-to-day, is somewhat ineffective, although it may help direct future studies such as this very one.

With Owl Labs focusing more on survey results, another research body called Mercer conducted research around the feasibility of working remotely. Their research pointed to 33% of companies today anticipating having at least 50% of their workforce work remotely post-COVID comparing that with a pre-COVID study that shows only 3.3% of companies willing to do the same [6]. The interesting thing about this research is that it does seem very limited in findings, so while their findings may be valuable, it is far too limiting to ultimately come to any real conclusion from this alone.

Another study that seemed rather limiting in scope, was KPMG's CEO Outlook study. KPMG's findings were quite optimistic for the future ahead as they pointed towards an increase in overall revenue growth, acquisitions, and product opportunities as a result of working digitally [5]. To be specific, their outlook didn't necessarily address remote work directly but instead focused on this digital transformation and increased flexibility that came alongside remote work. This study too lacks scope as it focuses primarily on the managers (C-suite specifically) and less so on the employees besides a few honorable mentions when discussing broad trends.

One very interesting article was by McKinsey where their study was focused much more towards managers and seizing the opportunity of remote work. McKinsey pointed to managers being able to cater towards employees' needs in this time of COVID to increase 3 critical factors: work effectiveness, engagement, and well-being [3]. These factors corresponded directly to the COVID pandemic as normal anxieties around job security, financial stability, and balance of life/work were increased exponentially. McKinsey was able to

explain two sides of remote work here with one being a natural, quite common increase in distress and the other being the overall opportunities this may have for a company.

IV. DATASETS

In consideration of the datasets for analysis, there were a set of criteria that each dataset had to meet in order to be considered of a high level of 'goodness'. This idea of 'goodness' establishes the quality of the original datasets to help validate the end results, declaring that the end analysis was faithful and true with respect to its input.

For the 7 datasets, the criteria were 3 distinct factors for each dataset to match which included the credibility of the data source, the data set's simplicity, and the recentness of data. Regarding the credibility of the sources, all the data sources came from distinct sources such as the New York City Local government, UK government, or a scientific research branch. Additionally, each dataset was as simple and straightforward as it could be in its original form. There was no pre-made analysis included in these datasets that would have tarnished its raw potential, as the idea is to run analytics on raw data and not the result of someone else's analysis that may be inherently bias or inaccurate. Most importantly, all datasets were conducted recently within the past 2 years to consider the COVID pandemic which, as mentioned previously, triggered this wave of remote work. With these criteria in mind, the datasets utilized were as followed:

NYC Property Sales Data (5 datasets total) – These 5 total datasets each correspond to a NYC borough that logged the sales of real estate within the past year [8]. Each log contained the following attributes: borough, neighborhood, address, building class (defined if was for residential, commercial, office, etc.), sale price, sale date, and a few others. These 5 individual datasets were used to calculate the overall costliness of office space in NYC to assess whether it was financially beneficial to move to remote work.

BOROUGH	NEIGHBORH	BUILDING CL	TAX CLASS A	BLOCK	LOT	EASEMENT	BUILDING CL	ADDRESS	APARTMENT	ZIP CODE	RESIDENTIA	COMMERCIA	TOTAL UNITS	LAND SQUAI	GROSS SQUA	YEAR BUILT	TAX CLASS A	BUILDING CL	SALE PRICE	SALE DATE
1	ALPHABET C	01 ONE FAM	1	374	46		A4	347 EAST 4TH STREET		10009	1	0	1	2,116	4,400	1900	1	A4	2,385,000	2/9/21
1	ALPHABET C	07 RENTALS - 2B		372	10		C7	274 EAST 3RD		10009	9	1	10	2,021	6,445	1900	2	C7	0	12/27/20
1	ALPHABET C	07 RENTALS - 2B		374	1		C7	301-303 EAST 4TH STREET		10009	8	2	10	1,501	6,929	1900	2	C7	3,672,530	11/24/20
1	ALPHABET C	07 RENTALS -	2	376	54		C4	719 EAST SIXTH STREET, 1		10009	20	0	20	2,302	9,750	1900	2	C4	154,196	6/11/21
1	ALPHABET C	07 RENTALS -	2	386	53		C1	233 EAST 3 STREET		10009	29	0	29	3,927	17,754	1910	2	C1	7,590,000	6/14/21
1	ALPHABET C	07 RENTALS -	2	390	57		C7	197 EAST 7TH STREET		10009	10	1	11	1,600	5,320	1910	2	C7	3,425,000	2/11/21
1	ALPHABET C	07 RENTALS - 2A		392	5		C2	151 AVENUE B		10009	5	0	5	2,139	4,416	1900	2	C2	0	3/31/21
1	ALPHABET C	07 RENTALS - 2B		394	37		C4	656 EAST 12 STREET		10009	9	1	10	1,273	6,365	1910	2	C4	3	6/30/21
1	ALPHABET C	07 RENTALS -	2	405	13		C7	510 EAST 12TH STREET		10009	20	2	22	2,581	10,090	1920	2	C7	9,923,209	4/23/21
1	ALPHABET C	07 RENTALS -	2	405	15		C4	514 EAST 12TH STREET		10009	20	0	20	2,581	9,730	1920	2	C4	9,482,177	4/23/21
1	ALPHABET C	07 RENTALS -	2	405	46		C4	533 EAST 11 STREET		10009	14	0	14	2,581	11,448	1920	2	C4	3	6/30/21
1	ALPHABET C	07 RENTALS -	2	406	11		C7	508-510 EAST 13TH STREE		10009	27	2	29	3,872	16,002	1900	2	C7	5,406,000	7/8/21
1	ALPHABET C	09 COOPS - \	2	373	49		C6	311 EAST 3RD STREET, 12		10009						1920	2	C6	500,000	11/24/20
1	ALPHABET C	09 COOPS - \	2	376	16		C6	248 EAST 7TH STREET, 2A		10009						1928	2	C6	510,000	11/25/20
1	ALPHABET C	09 COOPS - \	2	377	62		C6	249 EAST 7TH STREET, 11		10009						2001	2	C6	1,185,000	3/23/21
1	ALPHABET C	09 COOPS - \	2	377	67		C6	241 EAST 7 STREET, 2C		10009						1900	2	C6	409,000	1/6/21

Figure 2: Showing a snippet from the NYC rolling sales dataset

Well-being and Productivity of Software Professionals During a Pandemic – a survey conducted to software professionals was used to assess their overall feelings about remote work, conducted in November of 2020 [9]. Dataset schema included: feelings of loneliness, well-being, productivity, and many others. This was a very abundant dataset that helped to gauge what the end developers felt about remote work on a large scale, rather than just hearing from other people in everyday discussion.

Q7_Click_Co	Prolific_ID	Well_being_1	Well_being_2	Well_being_3	Well_being_4	Well_being_5	Productivity_	Productivity_	Productivity_	Productivity_
7		15	17	17	17	16	20	50	90	-60
7		17	18	18	18	17	27	38	100	-38
8		19	19	19	18	17	43	40	100	0
17		17	19	20	19	18	40	40	75	8
7		19	20	20	21	17	40	40	90	0
7		15	16	16	15	18	40	40	100	-30
8		20	20	21	21	20	42	36	80	-29
22		20	21	20	20	21	39	39	100	50
0		16	16	16	17	16	45	45	100	0
7		15	16	16	16	15	41	43	100	0
40		19	20	20	20	19	24	24	80	-8
11		19	19	19	20	19	37	37	70	-40
7		18	19	19	19	17	30	36	90	50
8		18	18	18	19	17	36	36	91	0
7		16	19	19	19	20	14	35	92	20
7		16	16	16	17	18	23	40	40	-20
										-40
										8

Figure 3: Showing a snippet from the Software Professional Survey

Online Remote Working Job Vacancies Estimates – This dataset compiled multiple industries together to assess how remote work affected the software industry compared to that of other industries [2]. This dataset was merely an indication of how common remote work was based on adverts that were tracked from May 2019 to Spring 2021. This industry-wide comparison helped to give weight to the idea of remote work

with software developers, as they were the easiest to move to remote and were more willing to compared to their industry peers.

Date	5/2/19	5/9/19	5/16/19	5/23/19	5/30/19	6/6/19	6/13/19	6/20/19
All industries	2.70%	2.70%	2.70%	2.70%	2.70%	2.10%	2.20%	2.20%
accounting / finance	1.70%	1.70%	1.70%	1.70%	1.80%	1.80%	1.90%	1.90%
admin / clerical / secre	1.10%	1.20%	1.20%	1.10%	1.10%	1.10%	1.10%	1.10%
catering / hospitality	0.30%	0.30%	0.30%	0.20%	0.30%	0.30%	0.30%	0.30%
charity / voluntary	3.20%	3.30%	3.00%	3.60%	3.60%	3.70%	3.90%	4.40%
construction / trades	1.30%	1.30%	1.30%	1.30%	1.30%	1.20%	1.20%	1.20%
creative / design / arts	2.50%	2.40%	2.30%	2.10%	2.20%	2.10%	2.10%	2.20%
customer service / supp	1.30%	1.30%	1.40%	1.20%	1.30%	1.20%	1.10%	1.10%
domestic help	0.90%	0.80%	1.00%	0.80%	1.10%	1.10%	1.10%	1.10%
education / teaching	9.70%	8.90%	9.30%	8.80%	9.20%	0.60%	0.60%	0.70%
energy / oil & gas	1.70%	1.50%	1.40%	1.50%	1.80%	1.90%	1.50%	1.10%
engineering	2.60%	2.70%	2.70%	2.60%	2.60%	2.50%	2.50%	2.60%
facilities / maintenanc	1.80%	0.90%	0.80%	1.80%	0.90%	1.20%	1.00%	1.20%
graduate	1.80%	1.90%	1.80%	1.60%	1.50%	1.50%	1.60%	1.40%
healthcare + social care	2.20%	2.20%	2.30%	2.30%	1.90%	2.20%	2.30%	2.40%
hr & recruitment	2.10%	2.10%	2.00%	1.80%	1.80%	1.90%	2.00%	2.00%

Figure 4: Showing a snippet from the Industry Vacancies Estimates

V. ANALYTICS & RESULTS

The analytical process was compiled largely using ad-hoc queries and MapReduce jobs, once again allowing the data to speak for itself and not overcomplicating the analysis. A key part of the analysis was also working with bash shell scripts to help speed up compiling MapReduce jobs and ingesting the data.

Ingestion

Ingestion of the data was relatively straightforward since all datasets were already compiled, removing the need for any sort of complex streaming data. As previously mentioned, this analysis worked with NYU Peel's Hadoop Cluster so the only ingestion that needed to be done was to move the data into HDFS (Hadoop Distributed File System) which was performed after moving the data into NYU's Peel Cluster.

Cleaning

The cleaning process of the analytics was designed to remove unnecessary data and to make each dataset contain only the most relevant information for further analytics. For all 7 datasets, Hadoop MapReduce jobs were run to drop columns and filter results into a clean dataset to be stored in HDFS for the next analysis step.

For the 5 New York City datasets, the main addressable issue was that the data was overabundant with unneeded attributes. Attributes such as building regulations and tax codes were irrelevant to the analytics while others such as the sales price, borough, and building class were the most relevant. Regarding the building class, the only value that was considered here was those that were classified as offices, as I wanted to only judge the price of offices in New York City [8]. I had to consult the glossary provided by the New York City Local Government to see that the building class codes that were considered offices were those that were prefixed by an 'O'. After filtering through the dataset while removing non-office buildings and considering only the borough, address, sales price, sale date, building class, year built, and the total amount of units in each building, the New York City sales datasets were successfully cleaned of unnecessary data.

The next issue with the New York City data was that there were now 5 cleaned datasets with each corresponding to a specific borough. My objective was to see the overall sales of offices in New York City, so my next step was to concatenate the cleaned results into a singular dataset. I accomplished this by adding a simple concatenate execution at the end of my bash script to validate the results of each cleaned dataset and then compile into a singular dataset for further analytics.

The Well-being and Productivity of Software Professionals During a Pandemic dataset, relative to the NYC datasets, had an abundance of data to work with, with nearly 200 columns based on the survey answers, raising a unique problem [9]. The analysis of this dataset was meant to only retrieve the most valued qualities of working remotely which were well-being, productivity, boredom, office setup, office

communication, and loneliness. As there were nearly 195 other attributes, I programmed another MapReduce job to drop all these unnecessary columns to only work with the relevant data for analysis as well as to reduce the file size (~90% reduction in file size after cleaned).

The Online Remote Working Job Vacancies Estimates dataset was already the cleanest of the 7 datasets with only the industries names and the estimated percent of remote workers compared to the total full-time employees [2]. The only cleaning that was needed for this dataset was to just drop irrelevant industries such as finance, HR, construction, and many others. The main industry that was needed was only the 'Software/IT Professionals', but I also selected a handful of others to help compare our primary industry to as well as keeping the overall industry average.

Profiling

The next step in uncovering results was to then profile the cleaned datasets. After each dataset was cleaned, a Hive table was constructed in correspondence to be prepared for being queried using Hive SQL. Hive tables were used as they made running flexible queries quickly and efficiently.

After the NYC Hive table was created and loaded in with the cleaned and concatenate NYC data, the first step was to get a general overview of how expensive office real estate in NYC could cost by finding the highest office building sale price by borough. The results were as followed: Bronx with a sale of $9,830,000; Brooklyn with $53,750,000; Manhattan with $809,912,583; Queens with $63,000,000; and Staten Island with $8,600,000. This massive range amongst the highest prices is of no surprise as the most densely populated areas (predominately Manhattan) would have the highest prices. The second query run showed an average sale price of each borough with the following: Bronx with $3,069,000; Brooklyn with $4,807,000; Manhattan with $64,627,000; Queens with $4,918,000; and Staten Island with $1,304,000. Clearly, this query result solidifies the previous query that pointed to the highest prices being in Manhattan, but an important distinction is that Manhattan sales are much larger in scope where office units are sold in much larger bulk, rather than smaller blocks like the Bronx or Staten Island. Regardless of the range of differences amongst the boroughs, the key takeaway is that office prices are quite expensive with a total square footage cost being $85.56 [7].

Now that a general overview of the office space cost in NYC is mapped out, the next query to run (and arguably more important) is to understand how the costs have changed during the pandemic. The next query considered an aggregate of all the boroughs to find that from November 2020 to September 2021, the total office space cost in NYC rose from $9,652.000 to $18,851,000 or a nearly 95% increase in cost. One very important note to mention is that square footage here was unfortunately not considered from a lack of complete data, but once again this high price is consistent with the previous analytics run in this research.

With the survey data by software professionals, the only valuable query was to calculate overall averages of productivity, well-being, loneliness, etc. Like the NYC data, the cleaned Well-being and Productivity of Software Professionals dataset was loaded into a Hive table and queried to uncover these averages. The average results from remote work, as surveyed by software professionals, resulted with the scores being well-being of 17.57, productivity of 37.27, boredom of 12.72, office setup of 16.06, office communication of 4.42, and loneliness of 38.07. These

results, when placed on the arbitrary score scale of 0 to 50 as to compare relatively, appears to have remote work create an increase in productivity and simultaneously loneliness, practically having their results be at the same level. Office communication is another interesting statistic as more respondents felt that their managers were not communicating clearly enough to their employees, possibly contributing to loneliness from working remotely.

Unlike the other datasets, Online Remote Working Job Vacancies Estimates dataset was NOT profiled in a Hive table, as the only analysis step that needed to be taken was to drop unnecessary industries and then do some simple average calculations. This dataset exposed industry averages of remote work during the period of 5/19/19 to 3/19/21 where the total average was at 4.18%, software* at 11.37%, marketing at 6.68%, and retail at 1.45%. Here we can clearly see software being far above the industry average for remote work and the highest compared to its peers, but this current timeline considers the period before and during the pandemic.

If this period is dissected into two parts, one for pre-COVID (from 5/2/19 to 1/30/20) and one for post-COVID (from 2/7/20 to 3/19/21), we can see a drastic difference. The total averages from the pre-pandemic period were 2.34%, 6.26%, 2.47%, and 0.65% for all industry average, software average, marketing average, and retail average respectively while, on the other hand, the post-pandemic period yielded results of 5.43%, 14.84%, 9.54%, and 1.99% for all industry average, software average, marketing average, and retail average respectively. Clearly, we can see a drastic increase in remote work that was caused by the pandemic where the software industry was most affected with an increase of 137.08% since the pandemic based on adverts postings.

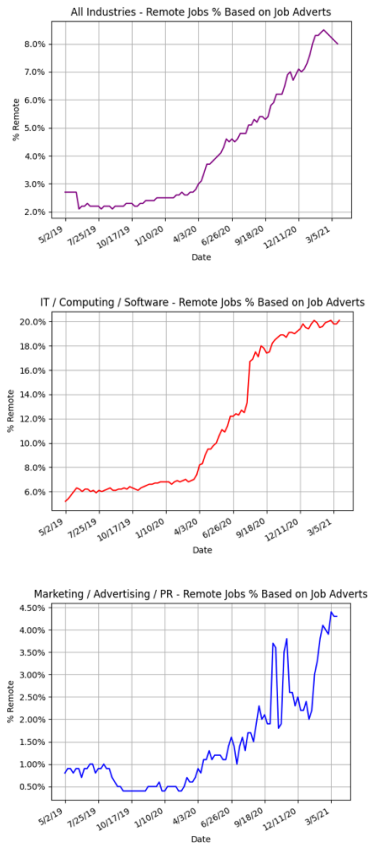

Figure 5-7: Showing the remote jobs over time by job advents

Results Summary

This analysis on remote work has successfully bore fruit with an analysis from both a developer's and a manager's perspective. For NYC real estate, we saw a massive 95% increase in office building prices over the past year. This increase in office price is significant as it is a financial incentive for managers to consider remote work to avoid these massive costs. Moving now to the developer's perspective, we see very high levels of productivity and loneliness from working remote with a score of 37.27 and 38.07 respectively. While this result may naturally appear to hurt the advocation of remote work for software developers, it is also important to note that office communication was quite low at a score of 4.42. This low office communication may be hypothesized as being the result of a lack of adaptability by

software companies when moving remotely and perhaps may increase with maturity. This low communication might also be a strong catalyst in pushing the factor of loneliness higher as developers feel isolated from their teams. Finally, by looking at the software industry compared to that of the overall industry averages, we see that software developers have naturally been more able to work remotely, further helping their case of doing so full time, as this suggest that perhaps that coming into a physical office may not be needed.

VI. CONCLUSION

From this analysis, it does appear that the overall benefits of software developers working remotely may have validity. Financial incentives, such as office cost analyzed here, may convince managers that the higher cost of having an office may not be worth it, particularly if software developers are naturally more adaptable to work remotely, as seen in the industry trends. Productivity also increased for software professionals remotely, but concern for loneliness and other potential side effects may be of grave concern going forward.

Even with strong, consistent results from this research, more studies must be done in the future. As just mentioned, the largest concern uncovered with this research is with the mental health effects of working alone remotely and more study should be done on how common this may be and how critical the effects are. I fear this may not be isolated to exclusively the software industry and may be an overall trend in remote work with potentially dire consequences.

Another, rather relatively less critical analysis that should be done, should also be more thorough analysis on coming into an office for work. Although the NYC data analyzed here did see rising prices, a lack of rent prices (most common for companies rather than buying) for office space is completely absent and might have different results. Additionally, more research should be done outside the scope of NYC, possibly around the world to see if these rising prices are universal and how exactly important this increase is for deciding whether to have a company office. Finally, more research should be conducted to see what other miscellaneous expenses for software professionals exist when they are coming into the office such as gas costs, office equipment, office utility expenses, subway trips, etc.

In conclusion, this analysis has found sufficient evidence to suggest that remote work for the software industry is beneficial for both the developer and the manager. While more work must be done to expand this evidence (or contradict it), remote work will likely be a contested subject for years that follow this pandemic but, if these benefits bear truth, then there is no denying that remote work will be here to stay for software professionals.

* For the sake of simplicity here, the term “software” here refers to the dataset label of “IT/Computing/Software”, “marketing” to “Marketing/Advertising/PR”, and “retail” to “Retail/Wholesale”.

Works Cited

[1] "2019 State of Remote Work Report." *2019 State of Remote Work Report*, Owl Labs, Sept. 2019, https://resources.owllabs.com/state-of-remote-work/2019.

[2] Casey, Abi. "Online Remote Working Job Vacancies Estimates" - *Office for National Statistics*, Office for National Statistics, 14 June 2021, https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/datasets/onlineremoteworkingjobvacanciesestimates.

[3] Emmett, Jonathan, et al. "Covid-19 and the Employee Experience: How Leaders Can Seize the Moment." *McKinsey & Company*, McKinsey & Company, 17 June 2021, https://www.mckinsey.com/business-functions/people-and-organizational-performance/our-insights/covid-19-and-the-employee-experience-how-leaders-can-seize-the-moment#.

[4] Iacurci, Greg. "Pandemic Pushes Search for Remote Jobs up 460%." *CNBC*, CNBC, 26 Aug. 2021, https://www.cnbc.com/2021/08/26/covid-pandemic-pushes-hunt-for-remote-jobs-up-460percent.html#:~:text=Job%20searches%20for%20remote%20work,employers%20will%20meet%20the%20demand.

[5] *KPMG 2021 CEO Outlook*. KPMG International Entities, Sept. 2021, https://assets.kpmg/content/dam/kpmg/xx/pdf/2021/09/kpmg-2021-ceo-outlook.pdf.

[6] Mason, Lauren, et al. *The New Shape of Work Is Flexibility for All - Mercer*. https://www.mercer.us/content/dam/mercer/attachments/private/us-2020-flexing-for-the-future.pdf.

[7] "New York City Office Rent Price & Sales Report." *CommercialCafe*, https://www.commercialcafe.com/office-market-trends/us/ny/new-york-city/#:~:text=Average%20office%20rent%20in%20New,averaged%20%2493.65%20per%20square%20foot.

[8] *Rolling Sales Data*, Department of Finance, https://www1.nyc.gov/site/finance/taxes/property-rolling-sales-data.page.

[9] Russo, Daniel, et al. "Well-Being and Productivity of Software Professionals during a Pandemic." *Zenodo*, 12 Nov. 2020, https://zenodo.org/record/4271923.