

**Has the Chinese Housing Boom Impacted the U.S. Stock Market?
Investigating the Potential Relationship Between China's Housing Price
Dynamics and the U.S. Stock Market**

By

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Abstract

In this paper, we review the effect that the boom of China's housing prices has had on the U.S. stock market and the potential connection between the two markets. Looking at it more in-depth, the U.S. stock market focus is on the S&P 500 and the eleven sectors of the stock market (Industrial, Healthcare, Real Estate, Utilities, Materials, Industrials, Information Technology, Financials, Consumer Discretionary, Consumer Staples, and Communication Services) while the housing prices are dictated by the residential housing price index within China. Given the relatively recent disaster in September 2021 regarding the Evergrande Group and their potential for failure, the connection between the two markets has come more into focus now than in recent history. The sectors have taken the brunt of the crisis with companies within all major sectors losing out on potential value with share prices falling from their recent highs. It has been determined by the research done in this paper that there is a significant positive relationship between the S&P 500 and the Chinese Housing Prices along with some of the sectors as well. The results fuel a discussion about what might be to come and the potential effects the housing market would have on their portfolio if it were to continue to boom or abruptly burst.

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Chapter 1: Introduction

When the Evergrande Group crisis hit on September 20th, 2021, it had a butterfly effect that people did not realize would be as massive as it was. The S&P 500 ended the day down 2.7% with the Dow Jones following in its footsteps by dropping 2.6%. This wave continued for a few days before subsiding, but questions remained about the Evergrande Groups' ability to recover from the presumed downfall. Meanwhile, investing has grown over the years from being private knowledge to now a big global public enterprise with each investor trying to maximize their portfolio as much as possible. As a result, investors have tried to gain an advantage at every edge to keep their portfolios in the green. What that day taught investors was that to understand the U.S. stock market, they need to understand the connection between the U.S. stock market and the Chinese housing market. The scenario that took place on September 20th, 2021, left me to research whether or not the Chinese housing boom truly has impacted the U.S. stock market

The Evergrande Group created a disastrous day for the U.S. equity market when it was announced that it might default on its loans and had roughly over \$300 billion in debt. The news of the Evergrande Group being deeply in debt sent shockwaves across the country and globe as investors tried to understand what the implications might be with this powerful development company in such bad shape. As a result of this news, the S&P 500 and the Dow Jones dropped more than 2.5% which is equal to more than 100 points for the S&P 500, a loss that cannot be underestimated. Furthermore, some of the bigger U.S. companies like Tesla, BlackRock, and Amazon all reported losses of more than 2.2% on the day with BlackRock, being a major debt holder of the Evergrande Group,

reporting a loss of 3.02% at its lowest point on the day. Not only did the U.S. equities drop as a result of this news, but the Evergrande Group took a hit on share price falling 20% and continuing the free fall to where it is down over 40% from September 20th, 2021, as of March 8th, 2022. These were losses that lingered for a couple of days as investors were worried about what was to come with all of Chinese Real Estate as the Evergrande Group was, at the time, the biggest development company within China. These combined losses showed how an event halfway across the world could have such an impact in the U.S. due to the relationship between the two markets. What BlackRock, Tesla, etc. and the Evergrande Group proved was how close these two markets are with each other and what the relationship may look like after further research.

Since 1999, the Chinese housing market has been going through a boom that it has not seen as a country before. Throughout this boom, it has been able to persevere through a world recession and continue to boom after this period. What makes this boom so important to the U.S. stock market is through the ways it has been able to enhance the bottom line of companies that operate within China and are connected to China. As the housing prices continued to increase over the years after the privatization of homeownership there was an expectation from investors that it would naturally decrease and eventually plateau to a point where it would become more stable and begin a steady growth. This common belief proved to be false as the housing prices continued to remain high in growth and was continued with companies and investors alike from the U.S. pouncing at the opportunity to jump in when the market was hot. What has followed is a vigorous growth of housing prices to a point where they have become unstable due to their volatility and Chinese development companies looking to take advantage of the

unseen hot market. Due to this, it is important to understand what the potential benefits have been for U.S. companies that have benefited over the past two decades and if those benefits outweigh a future collapse of the market.

The focus of the majority of the research found on the topic focuses on the effect that the housing boom has had on consumption, global markets, foreign direct investment, and the risk associated with the boom. With very little, if any, research focused on the specific sectors of the stock market and the S&P 500 which is where my research focuses. Koivu (2012) was able to establish that the increase of housing prices has a positive linear relationship with the amount of consumption from Chinese consumers. Wu, Jing, et al. (2016) looked at the potential risks the housing market might have but did not make a U.S. stock comparison. Furthermore, Dianchun and Jinghan (1998) examined how the level of FDI has impacted the real estate market in the past and how it can be used to elevate the real estate market. This research paper fills in the gap between the U.S. market and the Chinese real estate market and provides answers to the problem at hand where prior research has failed.

What this paper examines is how the boom of the Chinese housing market has impacted the U.S. stock market and attempts to answer what the impact of a hypothetical bubble burst would have on U.S. markets. First, understanding the nature of the relationship between these two markets helps provide a better explanation for how these two markets could be connected. One of these relationship builders is through the wealth effect of the rising asset prices in China. With asset prices rising so does consumption for luxurious and non-domestic goods, such as U.S. goods. With companies like Apple, Nike, and Starbucks dominating the Chinese market in their respective categories this

influx of wealth has been able to produce stronger sales and a stronger bottom line which reflects during their earnings at the end of each quarter. These stronger earnings then push a company's asset price as investors become bullish about their performance. This also leads to the next connection which is U.S. investor sentiment. If investor sentiment toward the housing market is bad, it will cause investors to pull their money out of the companies of the real estate market in China and invest it somewhere else. This domino effect would cause those companies in China to lose money and potentially default on their debt and cause the whole market to plummet along with them. By having sentiment high, it ensures that money continues to be pumped into the real estate market in China and keeps the boom continuing. However, given the recent Evergrande Group discussion, we have begun to see the causation that negative investor sentiment has on both markets.

In this paper the data was obtained from Yahoo Finance for company share prices and Fred St. Louis for independent variable data with OLS regressions used as the method to compare the data that was obtained from those websites. Having used Yahoo Finance it allowed the research to span back as far as the research was needed which dates back to April 2005 and up to October 2021. Furthermore, being able to select and filter out certain dates through Yahoo Finance enabled the data to be more concise instead of having it be an average of the quarter or month from which it was collected. The Fred database was able to encompass most of the data that was necessary for the paper to come up with accurate data that could be trusted. With countries like China reporting different economic figures on a monthly or quarterly basis it enabled the data for the independent variables to match up with the dependent variable data obtained from Yahoo Finance. Maintaining this level of accuracy and consistency among the data

allows the research found in this paper to be considered highly accurate and viable for future research.

Based on the data described above and using the OLS regressions, what was found in the research was a positive linear relationship among Chinese housing prices and the S&P 500 and other sectors of the U.S. stock market as well. This statistically significant figure proves that there is, at least, partial reliance on Chinese housing prices to continue to rise in order for the S&P 50 to continue to grow. Based on what we know from the 2007 housing crisis in the U.S., a collapse and eventual recession that follows sets the economy back years in regard to building back up the public's trust in the market along with their personal savings accounts. One of the bigger policy implications would be to install more checks and balances in regard to U.S. foreign direct investment into the Chinese real estate market. With essentially few checks into investing into China it makes the two markets rely on each other heavily in regard to financial success. If one economy were to start to falter, the other would as well with both feeling the effects of events that happen halfway across the world. With more checks and balances with FDI, it might stunt the growth of certain companies, but it would allow more market individuality among the two nations and less of a reliance on each other to maintain a favorable market.

The Evergrande Group created a disastrous day for the stock market and the question remains as to what will happen to the company. This initial shock was a big realization for investors and the housing market in China in general. What investors do not know is if the surge in China will eventually burst and sink the markets along with it. By exploring the relationship between the two markets, it will give investors and

companies alike an opportunity to explore the potential impact a burst or continual boom will have on the sectors of the U.S. markets. With the world searching for an answer to the housing bubble question, preparing for its impact will provide a lot of answers to the unknown.

Chapter 2: Literature Review

When trying to understand the research question the first thing to look at is the research behind the Chinese housing prices, doing so allows the readers to establish a baseline for what the market has been like and its fluctuations.

Lin and Tsai (2016) analyze the fluctuations of Chinese housing prices in five of the biggest cities within China and the effect that it had on global capital markets. By looking at the housing prices within major cities it would have a big enough impact that it would affect the capital markets and substantial enough to disrupt the rise and fall of the housing market. What they found was that when housing prices fall the global market capital is sensitive to a certain extent where if housing prices were to continue to fall the market capital would resist the positive correlation. In addition, Huang et al. (2021) look at how Covid has affected the housing prices within the urban environments of China and the number of foreign investment transactions that have occurred during that period as well. What the research found was that there was a small negative effect on the housing prices, but there was a large negative effect on the number of investment transactions during the same period. Within four weeks of the outbreak, housing prices had dropped by 2% and continued on this steady decline as the pandemic eventually led to a gradual recovery of the housing market.

An important aspect of the research is making the comparisons between China and U.S. markets because as we saw in 2007 the U.S. markets are very dependent on real estate and if China is similar then there should be a connection between the two markets. Lai et al. (2020) examines the comparisons between the Chinese housing market and its recent boom and the boom of the U.S. housing market before the bubble burst back in 2007 due to subprime mortgages. With rapidly increasing housing prices since 2009, it has quickly become one of the main factors behind the surge of the Chinese economy into becoming the second biggest economy in the world. With this recent surge, they mention how people have put their savings into the Chinese housing market because it has been strong in recent memory and has continued to hold its form. Due to the surge of investments foreign and domestic, if the bubble were to burst like how the article explains the spillover would be a global issue like the U.S. recession in 2007 and not only heavily impact China, but the U.S. as well.

Gao and Gu (2012) attempt to research the relationship between the real estate market in China and its stock market. What they found within the research is that instead of the stock market being the cause, the real estate market dictates whether or not stocks were being bought in China during most of their research. Because the stock and real estate market both consider interest rates, inflation, et al., by controlling for the factors they were able to show how when the real estate market started to take a dive stocks were being invested into less than before. While this research focuses on the Chinese stock market because the U.S. and Chinese stock markets work closely together it can be hypothesized that when the real estate market dipped in China, so did the U.S. markets.

Wu et al. (2016) analyzes the risk of the Chinese housing market and the potential implications that it would have on China's market system and the overall financial health of the world economy too. With real estate being an important driver for China's economy and thus the world economy, understanding how real estate values have risen by 14.4% since 2004 in thirty-five major cities is vital. One of the issues they found is that with housing units trading a very high multiple of their rent it will only take a modest shift of expectations to generate a sharp asset decline. Due to the real estate market living primarily on debt financing, Wu also found that this sharp asset decline would be catastrophic for these debt holders and their bottom lines.

Since the real estate boom in China has occurred another important facet is the amount of foreign direct investment (FDI) into the market. Due to this FDI, the real estate market has continued to expand and become more globalized, further establishing the link between Chinese real estate and American-based investors. Dianchun and Jinghan (1998) examine how global foreign investment into Shanghai's real estate system has contributed to its boom in the past and has made it well-positioned into the future. What they found was despite a strict monetary policy within China itself, the increase of foreign investments into Shanghai's development and real estate companies made it a very profitable business fairly quickly. They estimate that in 1993 over one-third of capital investments that went to China flowed into real estate development companies with certain areas like Shanghai receiving higher proportions than other areas with a revenue increase of 214% in one year.

Hui et al. (2014) looks at the recent trend of foreign investors into China's real estate market and why this trend has continued over the years. With the real estate market

heating up over the years, the authors mention that FDI in real estate has continued to grow with the investment totaling topping \$100 billion from the U.S. in 2010 for the first time. What this U.S. foreign ownership means is that a lot is riding on the performance of the Chinese real estate market. With over \$100 billion in the market today, when the market performs it will lead to great returns, but when the market sours it could turn out to be a drastic investment decision.

He et al. (2011) goes over what has made FDI in real estate for China so successful over recent memory. These investors are often profit-seeking and risk-averse and because the real estate market has continued to boom investors have made upon their initial investment while continuing to profit off the continual rise of the market. On the other hand, the authors note that the investors contribute to the fluctuations in the market by being blinded by the profit opportunity. With so much money within the market itself, a fluctuation in prices could lead to a panic by the investors pulling their money and reinvesting in other real estate opportunities around China. Ning et al. (2019) examine the investments made by U.S. investors into venture capital in China and the implications of these investments into the Chinese economy. What the authors found in their initial research was that a lot of the venture capital companies that were being invested in were related to finance/business, technology, and real estate. These venture capitalists in 2007 have started to recover since the recession and are very subjectable to market conditions across the world due to their foreign investment nature. When market indicators are bad the venture capital investments start to dry up and when market indicators are good there is a good amount of investment into the venture capitals.

Chueng et al. (2011) analyze the driving away from investing in the U.S. enterprises and investing more so into domestic Chinese companies following the 2008 financial crisis. What makes this interesting is because if the Chinese housing bubble were to burst the U.S. would be doing the same thing that China did. By withdrawing money out of the market, it would efficiently continue to sink the housing market within China and the companies themselves along with mutual funds and firms that are invested in those companies. This could lead to another global recession like in 2008 and would be detrimental to the global economy. Comparing the markets to each other establishes the similarities between the two and how they operate very similarly to each other. Meanwhile, it does not do a great job of mentioning how they are different from each other as well. It leaves the researchers guessing at the differences between the two markets and the role that the federal government plays in China's stock market and how they might play a role in the booming of the Chinese housing market.

In this article, Wang (2011) analyzes the misallocation of now privatized housing assets that were previously owned by the state. In this article, the privatization wave was just starting to take off and the subsequent rise in the market value of homes was being shown through the research of Wang. Today, the privatized housing takeover has been in full swing for a couple of years now and the market is hotter than ever before partly due to this privatization. What this means is we are unsure what will happen when this privatized takeover cools down, will the market continue to rise or will the bubble the housing market has built burst like the U.S. in 2007. What has been ignored in the research of the housing prices is the direct effect it would have on the U.S. stock market. While it does attempt to establish a connection between the two it does not make a direct

one and leaves the reader inferring the connection based on other research and information.

Another important piece relating to the Chinese housing market is the consumption of the average household within China. By studying the amount of consumption per household it can show their spending habits during economic boom and bust periods. Koivu (2012) also looks at how the asset prices in China affect the consumption of the average household. In the previous article, Koivu also found that there was a very limited wealth channel, albeit a positive linear relationship between assets and household consumption, regarding the rising asset prices of houses and apartments in China. What they found was that the rising asset prices caused people to save more to be able to afford apartments instead of houses and only a small portion was able to take advantage of the high prices and sell an apartment. What this means for the U.S. stock markets with the rising asset prices fewer investors in China would be buying equity into the companies causing the demand for the stocks to flatline.

Su et al. (2018) looks at how housing prices within China affect the consumption rate of residents within China. They note that based on studies done on the U.S. financial crisis of 2008 that the real estate markets might be the source of macroeconomic fluctuations. In their research, they found that rising housing prices from the resurgence of development companies, the stock market in recent years has been performing poorly and consumption has not been affected by the rise of the prices. They agree that there is no wealth effect with the rising asset prices for Chinese products, but do not show a level for U.S. goods and services. When looking at the research done on consumption by households in China it lacks to show the effect of the amount of investment into the real

estate market by Chinese investors. Because an increase in consumption leads to more money for households to invest in, establishing this link it can show that an increase in the assets could lead to more money for people to invest in.

Not only is it important to look at the assets, but also the real estate market as a whole and specifically the companies as well. Fung (2006) talks about the rise of the real estate market in China and how it has continued to grow throughout the years. In Shanghai alone, the real estate output of GDP jumped nearly 7% from 1990 to 2003 indicating the growth of the city. With land becoming more and more valuable the value of the market continued to grow because of the focus on developing the land within major cities and gaining the extra value out of the area. In his article Wang, et al. (2013) talks about how 272 real estate companies that are listed on the Shanghai and Shenzhen stock exchange markets use debt financing to their advantage and to help fund their companies. With 55% of the company's assets being established through debt financing, it has become a large part of how a Chinese real estate company operates and gains market value. By participating in long-term borrowing, it has a positive correlation with the market value of the company. But because all their money and value are established through debt it could be catastrophic if they would be left unable to pay the debt.

Feng et al. (2020) tackle the issue of overinvesting by real estate companies and what the pitfalls could be for this behavior. By overinvesting they are investing with the money that has been raised from their debt financing and this could lead to problems if their investments start to underperform their expectations. Furthermore, because of their overinvestments real estate companies often find themselves over diversified and unable to outperform the market to a degree that would allow them to continue to grow in value.

Due to these factors if the market does not perform to their expectations it will cause trouble for these companies and their investors along with them.

Huang and Boateng (2013) analyze the ownership structure of a real estate firm in China impacts the market value and number of investments into the company itself as well. What it showed is that when the state has a high ownership stake within the company it can lead to poor performance along with erratic gains, making the company look inefficient compared to companies that are privatized. Low legal shareholdings ensuring success for the company has led to a wave of privatized real estate companies that want to capture the boom in the market. This has led to an oversaturation of the market itself and can provide difficulty to investors who want to partake in the action but are unsure how to proceed. Wang et al. (2015) found when looking at the real estate companies that they are completely inefficient concerning the way that they use their debt financing, investments, and capital structure. With an average total factor productivity growth rate score of only 1.6%, they lack the technology and financial innovation to continually grow with the times. What this means to investors is that because they are stuck in the past the markets around them will continue to push past them leaving them behind. With more investors wanting a different company to invest in due to the inefficiency it has also helped lead to oversaturation within the market and potential exiting of the market within the near future.

Lastly, Sun et al. (2021) research a case study of the Evergrande Group and look at its financing, investments, and investments made by other companies into the company. What they found was the main financing of the Evergrande Group was debt financing with bonds being the main source of their debt. Furthermore, they would invest

in other Fortune 500 companies such as Apple, Tesla, among others. Due to the sheer size of the company it has to issue a lot of bonds to continue its debt financing and invest a lot of money into stocks to ensure they have the assets to back up their finances.

Furthermore, the Evergrande group's recent issue has led many to look further into this topic and hence the main driver behind this research paper.

Based on the prior research done in the field, there is a lot of knowledge surrounding the Chinese real estate market and surrounding areas. There has been research done on how the housing prices within China impact the global markets and foreign investment into urban environments of China and what the relationship is among the markets. This type of research between basic markets is followed by a very thorough analysis of the real estate market in China as a whole, not just the housing prices. The research in this area focuses on how it relates to its own stock market and what a potential downfall of this market would have on the world economy. Being able to relate the U.S. market and China markets to each other with their similarities and differences allows the research to further the relationship between the two and the potential connection they have with each other. Lastly, prior research has shown how the FDI and consumption within China changes based on the real estate market and the housing prices specifically too. These two factors, while not as focused as the other research, help expand upon the potential connection between the two markets and establish a stronger relationship between U.S. investors and companies alike with housing prices within China. While all of this prior research helps the framework of this paper, the research done here differentiates itself from past research into a new field of work.

What makes the research done in this paper different from prior research is the attempt to establish a positive, linear relationship between Chinese housing prices with the S&P 500 as well as the 11 sectors of the U.S. stock market. Looking specifically at the U.S. stock market and Chinese housing prices allows this research to step outside the boundaries of what has been covered before and venture into a different perspective about the risk investing into the Chinese housing market might have. Using roughly 15 years of data from the top three companies within each sector my paper analyzes this potential relationship between housing prices and U.S. market sectors. The contribution of this research allows the Chinese housing market to be researched to its full potential. The research prior has been able to establish a relationship with global markets, China's own stock market, FDI, and consumption. By looking at the U.S. stock markets it helps the average investor understand what might be to come from the bubble of the housing market in China. As the Chinese housing boom is an ongoing issue as shown with the Evergrande Group crisis in September 2021, this research paper pushes forward the analysis and provides people with answers to some of the questions they may still have about the housing market in China.

Chapter 3: Conceptual Framework

Over the past couple of decades, China has emerged to become a global powerhouse on the world stage regarding its economic status. With this emergence was the sudden development of real estate within China and the expanding of the industry into becoming the biggest real estate business in the world in residential value and second only to the U.S. in commercial real estate value. As it stands today, the real estate market in China takes up more than 30% of the total GDP value in China, a much higher mark

than the U.S. had at the height of its real estate boom in the early 2000s. As the market has boomed U.S. investors have enhanced it by being major investors attempting to take advantage of the unprecedented hot streak. The increased amount of investment into the Chinese real estate market has also enlarged the economic connection between the two. What follows is a conceptual framework that analyzes the questioned connection between the two markets and discusses the potential impact on the two.

One way that the U.S. markets are affected by the rising housing prices within China is due to the potential investor sentiment (Left Side of Figure 1). If the Chinese housing prices were to increase at an exponential rate and development companies were to start to give out riskier rates to take advantage then investor sentiment would start to decrease because of the potential bubble affect the housing prices have on the market at the moment. With investor sentiment decreasing and the housing market in a bubble, the default risk would significantly increase if the market were to crash, and this would decrease the investor sentiment as well. Through FDI and globalization, it would spill over into the U.S. investors due to the holdings that the Chinese development companies have on their balance sheet. With a decreased investor sentiment and potential default on loans, the development companies within China would have to start dumping their assets as shown with the Evergrande Group. Because their assets include U.S. companies, the dumping of the shares would drop the stock price for the U.S. companies that spark the U.S. markets into dropping. Not only would it hurt those companies that had their shares dropped, but also the companies that have invested in the Chinese development companies because it would tank the value of their assets.

Again, looking at the wealth effect between rising housing prices in China and the U.S. markets can help show a bigger picture of the influence that it has on American investors (Right Side of Figure 1). As shown through the research done in the literature review, when the housing prices rose in China people were bound to spend more money because they had bigger assets to do so and did not need to save as much. With this increased spending of the people within China, their consumption for more luxurious goods also rose with more foreign goods being bought due to their luxurious nature instead of more domestic goods. The want for more luxurious goods meant that U.S. companies would be able to take effect of the elastic demand of the goods and sell more than previously because of the asset prices continuing to increase in number. In the end, having them buy more luxurious goods enabled the balance sheet of the U.S. companies to be improved due to more of their goods being bought overseas. With the increase of the balance sheet, the numbers during earnings reports look better and so do U.S. investors' outlooks for the companies all because of the rising housing prices within China.

While investor sentiment and the wealth effect help establish connections between the U.S. and Chinese housing prices, ultimately, the U.S. companies are the ones that are affected by these connections. With the rise in consumption, foreign goods and services are the ones that benefit the most with U.S. companies operating within China. Furthermore, with higher investor sentiment there is more of a tendency to invest more into the market with U.S. companies gaining from this increase in sentiment. By focusing on how the U.S. companies benefit from operating within China, it adds another channel of potential revenue and growth from the rise of Chinese housing prices as the consumer

in China plays a big part in dictating housing prices and as such, dictating investment and consumption of goods and services offered by U.S. companies.

Looking at more sector-related examples where the two markets would be connected is through the use of manufactured goods and other services from the U.S.-based companies like GE, Maytag, and Whirlpool Corporation represented in Table 3 and Equation 4. As the residential market in China has boomed so have household appliances and the amount of electricity needed by the major cities within China alike. In June 2021 alone there were 110.54 billion yuan spent on household appliances and consumer electronics which equals roughly \$17.1 billion using mid-market rates. While this market has fluctuated over the past 3 years it is still up nearly double from August 2018 when the total consumption was only 68.21 billion yuan, an increase of 162% within the 3-year gap. This data helps show how the rising housing prices are affecting the materials sector that companies like GE are a part of. Due to the rising influx of demand for their goods because of the elasticity, the companies within the materials sector will be able to benefit from it and grow their balance sheets by increasing their foreign sales and eventually raising their stock price as a result.

In addition to consumption of goods and investor sentiment is the issue of resource constraint and the ability of U.S.-based companies to help ease the burden of the resource constraint problem in China. Represented by Equation 9 in Table 4, the consumer staples sector helps this problem. China has the problem of having to feed 20% of the world's population with less than 10% of the world's arable land and 7% of the world's potable water. This combined with their expanding real estate market has made the resources more needed than ever with an influx of people going into the major cities

due to the number of development properties. Fortunately for U.S. companies, they have been able to take advantage of this resource issue with U.S. companies Aquafina and Dasani being the biggest bottled water brands in the world leading the way in sales. With an expectation that the bottled water market will grow annually by 5.4% through 2025 and China having issues with its quality of drinking water, 7500 dead pigs floating in the Huangpu River, the bottled water industry has increased exponentially over the past decade. In 2020 both Aquafina and Dasani accounted for over a billion dollars in sales for the year with China being one of the biggest consumers of the global brands. With the growing revenue and business of bottled water in China, the consumer staples sector would also benefit from the rising housing prices by having the companies within the sector profit off of their goods. With the sector becoming more and more profitable there would be an increase of investment into the companies that own Dasani and Aquafina (Coca-Cola and PepsiCo) and eventually continue to push the share price through their sales.

Another connection between the rising housing prices in China and U.S. markets is the rising consumption rates within China among consumers. With residential prices within China receiving a lot of the boom it gives the owners of the assets the ability to consume more and the fast-food industry has been a big benefactor over the past decade as shown by the consumer discretionary sector in Table 4 and equation 12. The fast-food industry within China takes up nearly 14% of the dining and eating services in China and had total revenue of \$162.2 billion in 2021. With the top 3 spots of the fast-food industry being dominated by KFC, McDonald's, and Burger King these U.S. companies have been able to profit off of the increase in consumption by gaining more revenue and profit over

the past decade. Furthermore, this sudden boom in fast food has been able to benefit the consumer discretionary sector within the U.S. markets. With major companies within the sector like McDonald's and Yum! Being the benefactor of the rising asset prices would only help these companies as they grow and expand into different markets of China and take advantage of the boom in cash flow from the Chinese consumer spending more because of the rising asset prices.

Furthermore, the energy sector has also received the benefit from the rise in China's housing prices as shown with ExxonMobil represented in Table 3 and Equation 3. With housing prices on the rise, the need for more energy is more apparent than ever with China now being the world's biggest energy user since the sudden rebirth of the housing market back in the late 1990s. With this comes more need for FDI involvement and U.S. companies that can step in and help fulfill the need of China's energy problem. In this case, back in 2020 ExxonMobil signed a deal to power a petrochemical complex and to build the \$10 billion plant with construction slated to end in 2023 with 100% ownership of the plant. This type of FDI is relatively uncommon until recently as more and more U.S. companies are using FDI to take advantage of the current economic boom due to the rising asset prices within China. With the FDI on the rise and the usage of energy, so are the energy companies' bottom lines that are willing to invest in China and to use the housing boom to push their stock price higher than previously.

As stated above, the wealth effect has had a profound impact on the information technology sector as shown by Table 3 and Equation 6, and more specifically, Apple. According to the Wall Street Journal, Apple has pulled in more than \$55 billion per year in China, more than any other American company that sells goods and services within

China. As the country has progressed and the wealth effect continued this trend has only continued looking back into the past. Looking back at the December 2021 Quarter, Apple managed to set a record for the number of iPhones sold with the China revenue up 57% from the previous year. With the housing prices taking a little bit of a hit due to Covid as well as Apple it is interesting to notice the connection with both drastic rebounds for housing prices and Apple revenue within China. With housing prices back on the rise from Covid, it can be assumed that with the wealth effect more consumers within China wanted the sleek Apple products compared to Chinese Huawei phones that do pretty well themselves within China. By having the top company in the sector, and the stock market as a whole, it has been able to benefit the technology sector as shown through Apple and potentially the other companies as well.

Lastly, another premier example of the wealth effect impacting U.S. companies is through the healthcare sector with companies like Johnson & Johnson and Integra benefiting from the rise in wealth as shown by Table 3 and Equation 7. With spending on the rise in China and consumers spending more than ever due to the wealth effect, investments from consumers into buying their products has become more prevalent than before. With an increase of cash flow and wealth to the consumer, they are able to afford better medicines or treatments in regard to J&J. With Integra, an increase in wealth makes their insurance policies more applicable to people and has equaled a rise in insurance policy purchases over the past 15 years within the Chinese market. This jump in healthcare is due to the resurgence of the Chinese economy headed by the housing prices continuing to grow and consumers spending more due to their increased assets. It

has led consumers to look for better options with medicine and health insurance allowing U.S. companies to benefit from it.

When exploring the potential connections between the rising housing prices in China and the U.S. stock market a multitude of variables have been identified. However, investor sentiment and consumption rates are the two that stand out the most because they have the biggest impact out of the variables identified. Negative investor sentiment drives down the market and causes investors to pull out of the market and causes Chinese housing prices to drop as well. Meanwhile, positive investor sentiment encourages investment into the market and rewards investors with higher asset prices and increased confidence in the markets. An increased wealth effect encourages consumers in China to buy more foreign goods and services, allowing the major U.S. companies that operate within the marketplace to benefit from the increased spending in China on their products. In concurrence with the hypothesis of establishing a linear relationship between the U.S. stock market and Chinese housing prices, the conceptual framework shows the avenues that this relationship can take place and allow for a relationship to grow over the past 15 years as the housing prices within China has continued to grow.

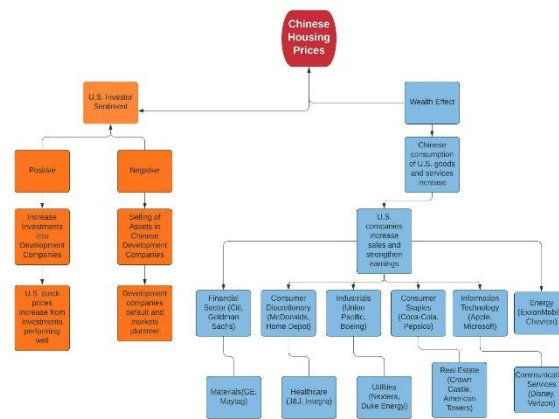


Figure 1. Conceptual Flowchart of the Potential Relationship

Chapter 4: Econometric Models

For my thesis, the main question is how the housing prices in China impact the U.S. stock market. To look at this question and the potential relationship between the two a regression was used to better understand this relationship. For the independent variable, the paper establishes the housing prices in China over the past few years and the S&P 500 as the main dependent variable for the essential equation. This regression is able to determine the strength of the relationship between the recent rising housing prices in China and the impact it has on the U.S. stock market. As shown below the essential regression is:

$$\text{Equation 1: } S\&P\ 500_t = \beta_0 + \beta_1 * \text{Chinese Housing Prices}_t + \varepsilon_t$$

In this regression, the S&P 500 refers to the adjusted closing prices of the S&P 500 from April 2005 to October 2021 with one piece of data per quarter being represented. Furthermore, the Chinese Housing Prices is represented by China's housing index over the same timeframe with the same quarterly data as well with 67 observations total for each variable. While this is the main regression regarding my research question

between China's housing prices and the U.S. stock market, other variables need to be controlled for and explained. The outside variables that impact real estate are Interest rates, Chinese GDP, Investor sentiment, unemployment rate, and consumption of the average Chinese consumer. By introducing these outside variables into the essential equation, it will allow for better results and more accurate analysis of the research question too.

Looking at interest rates it affects the housing prices with their impact on mortgages. With low-interest rates, people would be able to get fixed mortgage rates at a lower rate which would make homes and their properties more valuable than if interest rates were high. The GDP impacts housing prices because with a higher GDP the values of the home increase along with it due to the positive relationship that they share. When the GDP rises the economy is doing well and so is the real estate market. Investor sentiment has a huge impact because if the sentiment is low then the values of the homes decrease due to fears of people defaulting on their loans. Because of this, the market would start to drop, and the prices of the houses along with them.

Furthermore, with investor sentiment, because there are more retail traders, individuals change their strategy more often due to what is being said across financial platforms and social media. Low unemployment increases the future potential income of consumers and therefore the demand for housing increases as well. If the unemployment rate were high the potential future income would decrease and thus the demand for housing would as well. Furthermore, consumption is a variable that could affect housing prices due to the wealth effect. With higher consumption, the demand for better, more luxurious housing would increase, and thus the number of properties that are of higher

value would be sold rather than if consumption was lower. Lastly, U.S. interest rates and inflation would also have an impact on the result because they both affect the level of investment from the U.S. into Chinese development companies and the real estate market. With a higher level of investment, globalization becomes more apparent from both sides and strengthens the connection between the two sides.

$$\text{Equation 2: S\&P 500}_t = \beta_0 + \beta_1 * \text{Chinese Housing Prices}_t + \beta_2 * \text{Chinese Interest Rates}_t + \beta_3 * \text{Chinese GDP}_t + \beta_4 * \text{U.S. Investor Sentiment}_t + \beta_5 * \text{Chinese Unemployment Rate}_t + \beta_6 * \text{Chinese Consumption}_t + \beta_7 * \text{U.S. Interest Rates}_t + \beta_8 * \text{U.S. Inflation}_t + \varepsilon_t$$

After this initial regression was run I then focused on the individual sectors of the U.S. stock market rather than the entire market as a whole. These sectors are energy, materials, industrials, utilities, healthcare, financials, consumer discretionary, consumer staples, information technology, communication services, and real estate. For each sector, I took the top 3 performing U.S.-based companies as the baseline and used them as the sector's baseline performance. These individualized sectors allowed me to obtain a more varied analysis of the impact of China's housing prices on U.S. markets and offer more strength to my research question. Furthermore, it has allowed us to see which sector is the biggest benefactor or suffered the most while also seeing the potential volatility in all the sectors.

$$\text{Equation 3: Energy Sector}_t = \beta_0 + \beta_1 * \text{Chinese Housing Prices}_t + \beta_2 * \text{Chinese Interest Rates}_t + \beta_3 * \text{Chinese GDP}_t + \beta_4 * \text{U.S. Investor Sentiment}_t + \beta_5 * \text{Chinese Unemployment Rate}_t + \beta_6 * \text{Chinese Consumption}_t + \beta_7 * \text{U.S. Interest Rates}_t + \beta_8 * \text{U.S. Inflation}_t + \varepsilon_t$$

$$\text{Equation 4: Materials Sector}_t = \beta_0 + \beta_1 * \text{Chinese Housing Prices}_t + \beta_2 * \text{Chinese Interest Rates}_t + \beta_3 * \text{Chinese GDP}_t + \beta_4 * \text{U.S. Investor Sentiment}_t + \beta_5 * \text{Chinese Unemployment Rate}_t + \beta_6 * \text{Chinese Consumption}_t + \beta_7 * \text{U.S. Interest Rates}_t + \beta_8 * \text{U.S. Inflation}_t + \varepsilon_t$$

Equation 5: Finance Sector_t = $\beta_0 + \beta_1$ *Chinese Housing Prices_t + β_2 *Chinese Interest Rates_t + β_3 *Chinese GDP_t + β_4 *U.S. Investor Sentiment_t + β_5 *Chinese Unemployment Rate_t + β_6 *Chinese Consumption_t + β_7 U.S. Interest Rates_t + β_8 U.S. Inflation_t + ε_t

Equation 6: Information Technology Sector_t = $\beta_0 + \beta_1$ *Chinese Housing Prices_t + β_2 *Chinese Interest Rates_t + β_3 *Chinese GDP_t + β_4 *U.S. Investor Sentiment_t + β_5 *Chinese Unemployment Rate_t + β_6 *Chinese Consumption_t + β_7 U.S. Interest Rates_t + β_8 U.S. Inflation_t + ε_t

Equation 7: Healthcare Sector_t = $\beta_0 + \beta_1$ *Chinese Housing Prices_t + β_2 *Chinese Interest Rates_t + β_3 *Chinese GDP_t + β_4 *U.S. Investor Sentiment_t + β_5 *Chinese Unemployment Rate_t + β_6 *Chinese Consumption_t + β_7 U.S. Interest Rates_t + β_8 U.S. Inflation_t + ε_t

Equation 8: Industrials Sector_t = $\beta_0 + \beta_1$ *Chinese Housing Prices_t + β_2 *Chinese Interest Rates_t + β_3 *Chinese GDP_t + β_4 *U.S. Investor Sentiment_t + β_5 *Chinese Unemployment Rate_t + β_6 *Chinese Consumption_t + β_7 U.S. Interest Rates_t + β_8 U.S. Inflation_t + ε_t

Equation 9: Consumer Staples Sector_t = $\beta_0 + \beta_1$ *Chinese Housing Prices_t + β_2 *Chinese Interest Rates_t + β_3 *Chinese GDP_t + β_4 *U.S. Investor Sentiment_t + β_5 *Chinese Unemployment Rate_t + β_6 *Chinese Consumption_t + β_7 U.S. Interest Rates_t + β_8 U.S. Inflation_t + ε_t

Equation 10: Utility Sector_t = $\beta_0 + \beta_1$ *Chinese Housing Prices_t + β_2 *Chinese Interest Rates_t + β_3 *Chinese GDP_t + β_4 *U.S. Investor Sentiment_t + β_5 *Chinese Unemployment Rate_t + β_6 *Chinese Consumption_t + β_7 U.S. Interest Rates_t + β_8 U.S. Inflation_t + ε_t

Equation 11: Real Estate Sector_t = $\beta_0 + \beta_1$ *Chinese Housing Prices_t + β_2 *Chinese Interest Rates_t + β_3 *Chinese GDP_t + β_4 *U.S. Investor Sentiment_t + β_5 *Chinese Unemployment Rate_t + β_6 *Chinese Consumption_t + β_7 U.S. Interest Rates_t + β_8 U.S. Inflation_t + ε_t

Equation 12: Consumer Discretionary Sector_t = $\beta_0 + \beta_1$ *Chinese Housing Prices_t + β_2 *Chinese Interest Rates_t + β_3 *Chinese GDP_t + β_4 *U.S. Investor Sentiment_t + β_5 *Chinese Unemployment Rate_t + β_6 *Chinese Consumption_t + β_7 U.S. Interest Rates_t + β_8 U.S. Inflation_t + ε_t

Equation 13: $\text{Communication Services Sector}_t = \beta_0 + \beta_1 * \text{Chinese Housing Prices}_t + \beta_2 * \text{Chinese Interest Rates}_t + \beta_3 * \text{Chinese GDP}_t + \beta_4 * \text{U.S. Investor Sentiment}_t + \beta_5 * \text{Chinese Unemployment Rate}_t + \beta_6 * \text{Chinese Consumption}_t + \beta_7 * \text{U.S. Interest Rates}_t + \beta_8 * \text{U.S. Inflation}_t + \varepsilon_t$

These equations along with the essential equation have helped further analyze the research question and discover the impact or the potential impact that the rise in China's housing prices has on the U.S. stock market.

Chapter 5: Data Descriptions

In the analysis of whether or not housing prices have a dependable relationship with the U.S. stock market I used Chinese housing prices as the main dependent variable to analyze this relationship. This data has been obtained from fred.stlouis.org to ensure its accuracy by taking it from a Federal Reserve database and has a quarterly frequency in its reporting of the data. The data depicts the average residential housing prices within China from 2005 to the present day to ensure that there will be enough data points to obtain a reliable result from the data and receive a high enough R-Squared value that the data is reliable. Furthermore, starting the data from China in 2005 gives the housing market prices within China enough time to cement itself with the data and not provide any egregious results. The housing boom began in the late 1990s in China and if the data were to start at the very beginning there would be no time for the globalization of the markets to take place and would have very minimal international spillover. This 6-year buffer enables the markets to intertwine with each other on a global level and provides both sides enough time to invest in each other to form that connection.

To look at the impact that the housing market has on the U.S. stock market I used the S&P 500 and the eleven sectors within the stock market as the independent variables

for the equation. Using the S&P 500 established a general performance baseline for the impact as it is used as the typical benchmark for American market performance.

Meanwhile, the eleven sectors within the stock market provide a more detailed look at how each sector is independently impacted by this relationship. To establish the performance of each sector, I gathered data of the top 3 U.S.-based companies within each sector from Yahoo Finance and obtained the adjusted closing prices of all 33 companies from 2005 to the present. By using the adjusted closing prices, it ensures that the entire trading day period is accounted for and not just the open trading hours of 9:30 am-4 pm, but also the after-trading hours of 4 pm-8 pm.

After gathering the adjusted closing prices, the data gives a weighted average for each sector with each company being accurately represented by their respective stock price regarding the overall price for the sector. The weighted average was calculated by summing up all of the top 3 company's share prices and then dividing the sum by each individual stock price per company. After dividing, the divided number was then multiplied by the original share price of the company. When each company's new share price was calculated, the three companies' new share price was then summed up to create the overall sector share price that would be used in later calculations and regression analysis.

With this, it controls for each company's respective size and does not give too much power to the final number of the sector stock price. Furthermore, I have taken into account the recent rise of certain companies within the past 10 years and have eliminated them from their sectors concerning choosing the three companies to represent a sector. What this means is that companies like Tesla, Amazon, and Alphabet are not

incorporated into the data because there is either not enough data or their stock price has risen exponentially over the past decade and incorporating them would skew the data completely. Choosing companies such as Nike, Home Depot, GE, etc. that have a large spectrum of data available make the regression more equipped to provide an understanding of the connection between the two main variables.

While those are the main variables that are accounted for in my regression there are also several control variables that data has to be accounted for and obtained too. The control variables are Chinese Interest Rates, Chinese GDP, Chinese Unemployment Rate, Chinese Consumption, U.S. Interest Rates, and U.S. inflation. All of these variables are outside factors that impact the two main variables and ensuring that they are controlled helps better understand the potential connection. Just like the Chinese housing prices data the information has been obtained from the Federal Reserve database and separated into quarterly data to correspond with the housing price data timeline and frequency.

Chapter 6: Descriptive Statistics

A. Sample Description

Looking at Table 1, first, we have to understand what the abbreviations at the top of the table are and their descriptions as descriptive statistics. First, the statistic “N” is referring to the number of observations that were recorded for each dependent variable that is listed among Table 1. “Mean” is referring to the mean of those 67 observations of share price that were recorded by adding up all of the 67 share prices and then dividing by 67 to achieve the mean. The medium describes finding the medium of the dataset analyzed. This is achieved by finding the middle value of the observations and with 67 observations there is a middle value that would be found between the first and last

observation. Next, the “SD” shows the observer the standard deviation from the mean with a more concise SD showcasing better concentration of data and a widespread SD more dispersed data. Lastly, the “Min” and “Max” show the minimum and maximum values of the share price from the dataset that was used in the summary statistics. This allows the observer to understand the full range of the variable and the highs and lows of the data.

In the analysis of the potential relationship between China housing prices and the U.S. market the main variables remain the S&P 500 and the top 3 U.S. companies from each sector put together using a weighted average. Some of the sectors are represented with an abbreviation due to constraints on their names with mats being materials, tech (information technology), hc (healthcare), ind (industrials), cons (consumer staples), re (real estate), cond (consumer discretionary), and comms (communication services). Each company was selected by market share of the sector with more recent, bigger companies like Tesla and Amazon being thrown out due to potential skewing of the data that would occur if they were to be used. The data that has been collected has been obtained from Yahoo Finance and put together on a quarterly basis starting in April 2005 and ending at the end of the third quarter October 2021. The gathering of the data resulted in 67 observations per variable and has been put together in Table 1 above to analyze the variables themselves from the start in 2005 to the end in October 2021. Using all 11 of the sectors enabled me to further my analysis by covering all the U.S. market landscape instead of focusing on strictly the market baseline of the S&P 500. Furthermore, due to focusing on strictly U.S. companies in the sector analysis it eliminates the potential bias that the S&P 500 would return due to only 71% of the revenue in the S&P coming from

U.S. based companies with the top three other countries being Japan, United Kingdom, and China.

While only the main variables are listed in the descriptive statistics, other control variables were used to ensure the accuracy of the analysis which included, U.S. interest rate, China GDP, U.S. investor sentiment, China unemployment rate, China consumer price index, and U.S. inflation rate. Most of this data was obtained from fred.stlouis.org but other sources were also involved in obtaining the U.S. investor sentiment as data was not available on the FRED website. The data was also obtained on a quarterly basis with the 1st of each quarter used if the data was obtained on a daily basis. This means that the 1st of January, April, July, and October were used in the analysis as the dates resulting in 67 observations per variable enabling a comparative analysis that is accurate by nature.

B. Variable Description

Looking specifically at the SD and Mean allows the paper to enhance the level by comparing whether or not the data is dispersed from the mean or is concentrated around the mean. First, the S&P 500 has a mean of 1933 and a standard deviation of 849. This represents a standard deviation of roughly 44% from the mean. While this may be considered relatively high, the 11 sectors of the stock market show different standard deviations from the mean. Energy has a 28% CV rating which is represented by the equation $SD \div \text{medium}$. The other 10 sectors are mats = 68%, finance = 101%, tech = 116%, hc = 68%, ind = 29%, cons = 45%, utilities = 45%, re = 74%, cond = 82%, and comms = 46% CV. In the grand scheme of the overall results, the S&P having an CV of 44% is considered pretty standard to condensed compared to the rest of the sectors.

Sectors like information technology and finance have CV over 100% indicating a wide spread of deviation from the mean. One of the reasons for this very high CV score is due to the growth that the two sectors have undertaken in the past 15 years. As technology and finance has progressed the companies within these sectors have been able to capture this progress and upgrade their share prices considerably, at the cost of having a condensed standard deviation from the mean. Other sectors like industrials and energy with CV scores of 28% and 29% respectively, represent the other end of the spectrum with all the other sectors falling in between the four mentioned. These sectors are considered to be really low variance in their share prices and did not have too much growth as shown by the min and max results.

Due to the nature of the low end of the spectrum falling at 28% and the high end of the spectrum falling at 116% the research considers any of the CV scores that falls below 62% to be considered those of low variance and condensed standard deviations and any CV score that falls above that line to be high variance and dispersed. This total was calculated by adding up all of the CV scores and then dividing it by 12, the number of variables, to achieve a percentage 62.27% that was rounded down to 62% for consistency purposes. With this mean CV in mind, the sectors and index that are considered to be condensed and low variance are the S&P 500, energy, industrial, consumer staples, utilities, and the communication services sector. Meanwhile, the sectors that are to be considered high variance and dispersed are the materials, finance, information technology, healthcare, real estate, and consumer discretionary sectors. This range of CV allows us to better understand the standard deviation between all of the variables mentioned above and how their datasets compare to each other.

The main variable, the S&P 500, had a mean of 1933 with a high 4357 which is roughly twice that of the mean for the 16 years of data. With a standard deviation of 849 shows the volatility of the S&P over that timeframe as it fluctuates greatly from the mean by roughly 43.8%. A lower standard deviation would have resulted in data that was closely tied to each other, but the high standard deviation, mainly due to the increase of the S&P 500, has it fluctuating greatly over the bell curve.

Looking at the other 11 sectors, industrials have the highest mean at 126 with finance having the second highest at 104. However, the highest among all of the sectors is information technology with a weighted average share price of 437 with finance being in second with a weighted average of 376. Having one of the worst overall minimum weighted averages to become the highest average share price of the sectors shows the growth the information technology sector has gone under in the past 16 years. As technology has progressed in the past 15 years with some of the biggest companies in the world being a result of that boom, Alphabet, Apple, and Microsoft.

Meanwhile the Communication Staples sector showed the most limited growth by only being up 200% from their mean to their highest weight average share price. Composed of AT&T, Verizon, and Comcast there was very limited growth over the past 15 years even with the enhancement of phones and upgrades in service with 5G becoming more prevalent in the present and into the future. The companies were not able to capitalize as much as time progressed and it shows in the descriptive statistics.

Variable	N	Mean	Medium	SD	Min	Max
ussp500	67	1933	1615	849	811	4357
energy	67	59.3	60.8	16.7	30.9	87.4
mats	67	94.4	69.8	65.1	28.3	262
finance	67	104	60.4	105	19.2	376
tech	67	94.8	35.7	110	17.7	437
hc	67	69.7	54.5	47.1	27.3	227
ind	67	126	132	36.4	41.7	199
cons	67	62.6	55.3	28.2	29.8	131
utilites	67	43.9	41.9	19.8	19.2	84.8
re	67	72.2	54.3	53.6	17.2	213
cond	67	76.5	55	63.1	15.4	247
comms	67	25.9	26.2	11.9	10.1	50.1

Table 1. Descriptive Statistics of S&P 500 and All Sectors

C. Correlation Matrix

In Table 2 it depicts the correlation matrix for equation 2 which is the S&P 500 and all variables as well including chnhp (China Residential Housing Prices Index), usir (U.S. Interest Rate), chinagdp (China's GDP), usinvsnt (U.S. Investor Sentiment), chinaur (China Unemployment Rate), chncpi (China Consumer Price Index), usinf (U.S. Inflation Rate), and chnir (China Interest Rate). In the matrix the higher the coefficient is the more connected the two variables are to each other with 1 being the highest coefficient possible and -1 being the lowest coefficient possible. In the matrix the same variables are the only ones with a coefficient of 1 because they are the exact same, but there are negative coefficients which means that the variables are not connected together at all. In the first column involving the S&P 500 the relationship with housing prices in China is pretty high showing a coefficient of .847. With the focus of the paper trying to understand the potential relationship of the two markets, having this coefficient be a .847 is a strong statistic that can demonstrate the potential linear relationship that these two markets have with each other.

Looking at the Chinese housing prices index column, a statistic that stands out is the coefficient of .8685 and shows how closely connected the housing prices are with the GDP within China. With housing prices booming over the past 20 years, it has become a driving force of the economy within China and plays an important role in the overall level of growth of the GDP. Furthermore, there is a strong disconnect with interest rates as higher interest rates makes mortgages tougher and more expensive which allows real estate companies to profit more and causes the consumer to suffer more too. Next, the U.S. interest rate has a strong disconnect with China's GDP as shown through the coefficient being -.5147. This coefficient is realistic due to the U.S. interest rate having little effect on China's GDP with the only potential connection is through the exports and imports of both countries to and from each other. Other than this strong disconnect the other coefficients aligned with the U.S. interest rate appear to be pretty mild in regard to their potential connection or disconnection.

Just like housing prices and GDP having a strong relationship, the linear relationship between China GDP and CPI at a .9939 is the highest coefficient in the matrix and can almost be perceived as being a 1. With the CPI being a major factor in the GDP of a country and how much people buy the basket of goods it makes sense for the strong relationship to be there between the two variables. Another coefficient that stood out with the GDP of China was with the S&P 500 being a .8711. With the biggest index in the U.S. and the GDP of a major economy like China being uniquely aligned demonstrates a potential for a strong relationship to be there with both rising and falling as one in the same.

In the U.S. investor sentiment, it is interesting to note there is not a strong positive or negative relationship with any of the other variables. It barely goes above the .1 coefficient level in either direction so is moderate by nature in its relationship with the other variables. The Chinese unemployment rate has a strong relationship with the S&P 500 having a coefficient level of .7161. With a lot of the companies operating on the S&P outsourcing manufacturing among other aspects of the business to China, having them be intertwined with each other is a realistic outcome due to the nature of the business. With more workers at hand the companies are able to push more goods and services out into the public and profit off of the increase of supply, while controlling for the demand of the product. Besides the strong connection with China's GDP, the CPI for China also has a high relationship with a coefficient of .8538 with the S&P as well. With people spending more money buying the basket of goods that make up the CPI, like the unemployment rate, there is more profitability for U.S. companies. Thus, both of the variables have a strong relationship because with the more money the S&P companies receive the more goods and services they can supply into the market creating the full circle effect where the money flows back and forth between consumer and business.

The U.S. inflation rate did not have a relatively high relationship with any of the variables but did show some promise with the U.S. interest rate. Interest and the inflation rate work together as the interest rate is raised to curb high inflation and the interest rate is lowered when the inflation rate starts to drop back down to normalcy. High inflation rates help restrict spending by consumers and promote investing, so the overall money supply is restricted and condensed from its height allowing for less money to be in circulation. As a result, this brings down inflation and can show the relationship the two

variables have with each other. Lastly, the Chinese interest rate demonstrates a strong disconnect with China's GDP. With GDP tracking a promotion of growth in the economy of a country, interest rates might curb that growth if inflation becomes too high and then interest rates are raised as a result. With this in mind GDP growth is uninhibited when there is a lower interest rate ensuring that consumers within the market economy are free to purchase goods and services with little restriction. When the interest is higher, those same consumers are restricted to spend money and spending drops along with potential GDP growth.

Variables	ussp500	chnhp	usir	chinagdp	usinvsnt	chinaur	chncpi	usinf	chnir
ussp500	1								
chnhp	0.847	1							
usir	-0.1852	-0.368	1						
chinagdp	0.8711	0.8685	-0.5147	1					
usinvsnt	0.1062	0.0057	0.0279	0.0617	1				
chinaur	0.7161	0.7711	-0.08	0.6409	-0.107	1			
chncpi	0.8538	0.859	-0.5511	0.9939	0.0377	0.6186	1		
usinf	0.1742	0.0348	0.3644	-0.1278	0.0391	0.0017	-0.127	1	
chnir	-0.3945	-0.565	0.326	-0.5108	-0.0427	-0.4383	-0.4772	0.4381	1

Table 2. Correlation Matrix for the S&P 500 and Other Control Variables

D. Scatter Plot

The two-way scatter plot in Figure 2 illustrates the relationship between the S&P 500 and Chinese housing prices. The scatter plot is organized with the Chinese Housing Price Index listed on the X-Axis and the index price for the S&P 500 listed on the Y-Axis. The 67 observations that were recorded from the S&P 500 are shown by the blue dots and the best fitted is shown as the red line running through the middle. The horizontal axis represents the Chinese housing prices over the 67 observations made ranging from a little below 90 to slightly over 115 on the Chinese residential property prices index. Meanwhile, the vertical axis shows the share price of the S&P 500 index

starting slightly below 1000 and ending at 5000. The scatter plot indicates that there is a positive relationship between the two variables and the best fit line also shows what will be indicated in Table 2 with the correlation being positive as well. This demonstrates that the model used was an effective tool to measure the relationship and can be used as an accurate demonstration of the relationship.

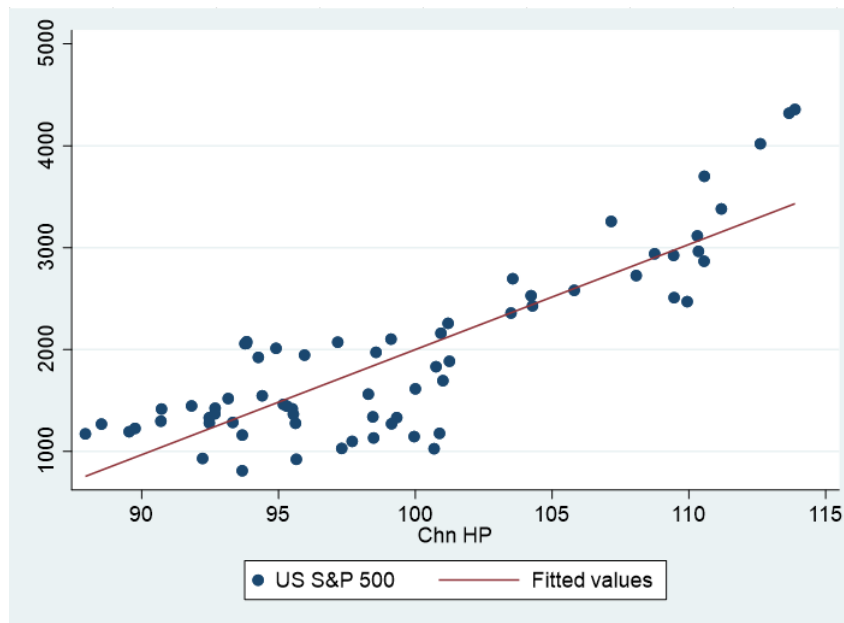


Figure 2. Scatter Plot of the S&P 500 and China Housing Prices

Chapter 7: Regression Results

A. Regression Results Equations 1-7

Next, in Table 3 is the regression analysis of regressions 1-7 involving the U.S. S&P 500 essential equation, S&P 500 with all variables, energy, materials (mats), finance, information technology (tech), and healthcare (hc). What was analyzed is how each regression equation was impacted by the variable involved and which of the statistically significant results of the sectors were impacted the most or the least.

Looking at the R-Squared for the equations 1-7, as mentioned before, the essential equation had a R-Squared value of .7174 with the rest of the equations having a better R-Squared value with the high being the material sector regression with a R-Squared value of .9088. R-Squared values that are considered to be at a level of statistically reliable analysis in finance is a .7 or better. With the data in the paper, using this level of R-Squared provided a baseline for the regressions to test against and the reliability of each one. Having all the R-Squared values within this range demonstrates the accuracy of the data and of the regression results that were produced. It allowed us to take the data as legitimate and analyze it to better understand how each of the independent variables affect the dependent variable in each regression.

Table 3 contains regressions 1-7 that were run, and all of the variables attached to them as well. In order of the variables listed, Chinese housing prices (chnhp), U.S. interest rate (usir), China GDP (chinagdp), U.S. investor sentiment (usinvsnt), China unemployment rate (chinaur), China consumer price index (chinacpi), U.S. inflation rate (usinf), China interest rate (chnir) and the constants (_cons). Looking at the housing prices line item, the only dependent variable that gets a significant statistic is the S&P 500 when it is by itself. With a p-value of less than .001 it gives a very statistically accurate representation of the correlation between the two variables. Other than the first regression, all of the other regressions have a positive correlation, besides finance, but do not have statistically significant statistics. This shows that they do have a positive linear relationship with Chinese housing prices with the top 3 companies in all the sectors rising when the Chinese housing prices go up as well. Finance having a negative correlation is

surprising due to the investment opportunities that the boom in real estate has given U.S. banks with a rise in prices ensuring the investment would continue to grow.

Reasonably enough, the U.S. interest rate has a significant impact on the sectors and their performance. The S&P 500, energy, materials, and finance sectors all had a statistically significant correlation when the regression was performed. All of these sectors being able to benefit from an increase in interest rates is due to their ability to the increase in lending for finance or energy prices and material costs in the case of the other sectors. While the other sectors benefited as well, it is interesting to note that an increase in the U.S. interest rate caused the S&P 500 to jump higher in share price than compared to a jump in Chinese housing prices.

China GDP shown in the next line item has a miniscule impact on the S&P 500 and sectors listed. This is primarily due to the overwhelming number of China's GDP compared to the share prices of the sectors. Due to this large gap in numeric value, it created a situation where the number has virtually no impact on the variables listed. U.S. investor sentiment was one of the variables that I was very curious to analyze as it was represented in value by a percentage basis with a negative meaning people were mostly bears and a positive percentage representing people were mostly bulls about the current market situation. It created a scenario where the percentages flipped on a monthly basis and times of crisis were duly noted with the Great Recession and the Covid drop/rebound being anticipated by the investor sentiment percentages.

Due to this information, the data might not be statistically significant, but created a scenario where all of the independent variables listed have positive results associated with them with the S&P 500 having the highest associated with an increase of 284 index

share points. Next, China's unemployment rate produced a high level of significant results which was something that was not expected when analyzing the data beforehand. All the sectors had a statistic of at least $p < 0.01$ with only the S&P 500 not having a statistically significant number. With most of them showing positive coefficients, except for energy, it shows that when the unemployment rates, the share prices of the top companies increased. The increase of spending due to more consumers in the market enables the companies to profit off an increase in employment.

Looking at China's CPI, there is not a statistically significant number, but once again energy has a negative coefficient associated with the variable. This could be due to the basket of goods that goes into calculating the consumer price index by household. If energy rates were to rise then the CPI would increase, and people would try to find cheaper alternatives to balance out their basket of goods and services. With information technology, the rise in CPI allows them to gain more profit from it as people will not change the way they store data or consumer information thus enabling them to gain a slight edge from a rise in CPI.

Besides China's unemployment rate, the U.S. inflation rate had a profound effect on the regression results with significant results being produced in every sector except for the energy sector. High inflation rates generally come with higher interest rates and an increase in the overall price level of goods and services. As such, finance having a coefficient of 11.49, information technology having a coefficient of 17.09, and healthcare with a 7.364 all make sense to be positive and statistically significant. Banks and healthcare companies are able to charge higher interest rates for loans and medical services. Meanwhile, information technology companies become more profitable by

being able to charge more for their products and cloud services. The top companies gain from a small increase in inflation as their profit margins are able to increase. Lastly, China's interest rate has no significant results, but has mostly negative coefficients except for energy.. With an increase in the interest rates, the S&P and the 4 other sectors take a hit to their share prices. With information technology taking the biggest hit with losing 16.09 share points, it gets rid of the gains made from all the other variables except for U.S. inflation rate and China unemployment rate. A lot of the bigger tech companies have outsourced their warehouses and industrial factories to China and because of this an increase in the interest rate causes them to spend more on exporting their product and maintaining their service level in China.

Variables	1	2	3	4	5	6	7
	ussp500	ussp500	energy	mats	finance	tech	hc
chnhp	103.2*** (-12.85)	5.093 (-0.35)	0.421 (-1.14)	0.77 (-0.71)	-3.335 (-1.82)	2.928 (-1.3)	0.701 (-0.75)
usir		115.1*** (3.78)	1.718* (2.19)	4.826* (-2.11)	47.72*** (-12.31)	2.896 (-0.6)	1.479 (-0.74)
chinagdp		1.36E-10 (1.50)	4.58E-12 (1.97)	-3.20E-13 (-0.05)	-7.06E-12 (-0.61)	3.52E-12 (-0.25)	4.40E-12 (-0.75)
usinvsnt		284 (1.27)	6.156 (1.07)	16.34 (-0.98)	45.27 (-1.6)	2.131 (-0.06)	4.186 (-0.29)
chinaur		234.1 (1.92)	-14.54*** (-4.63)	34.44*** (-3.77)	43.08** (-2.78)	101.0*** (-5.27)	22.04** (-2.77)
chncpi		13.51 (0.40)	-0.0615 (-0.07)	4.19 (-1.66)	1.749 (-0.41)	1.975 (-0.37)	0.969 (-0.44)
usinf		121.0*** (3.86)	0.55 (0.68)	5.783* (-2.46)	11.49** (-2.88)	17.09*** (-3.47)	7.364*** (-3.6)
chnir		-102.2 (-0.60)	7.086 (1.62)	-6.227 (-0.49)	-3.912 (-0.18)	-16.09 (-0.60)	-11.91 (-1.07)
constant	-8321.0** (-10.40)	-2214 (-0.90)	19.15 (0.30)	-527.0** (-2.86)	71.31 (-0.23)	-846.9* (-2.19)	-208.8 (-1.30)
N	67	67	67	67	67	67	67
t statistics	in parentheses						
	* p<0.05, ** p<0.01, *** p<0.001						

Table 3. Regression Results for Equations 1-7

B. Regression Results Equations 8-13

In Table 4 it has analyzed equations 8-13 which involve industrials (ind), consumer staples (cons), utilities, real estate (re), consumer discretionary (cond), and communication services (comms). Before going into the data in the table I discuss the R-Squared values to determine the relationship between the sector and the Chinese housing prices while also analyzing whether they relate to the R-Squared values found in the regressions from Table 3. Looking at these regressions, the lowest R-Squared value is found with the industrials sector with a R-Squared value of .6784 and the highest R-Squared value is a .9689 found in the communication services sector. While the industrial sector falls below the threshold set earlier of a .7, it is close enough to the .7 mark that it can still be considered reliable results and can be used to analyze the sector completely, albeit with not as much accuracy as other sectors that are above the .7 threshold. Other than the industrial sector outlier, the other R-Squared values fall above the .90 line and are very accurate in regard to the data that was produced as a result of the regressions indicating that the coefficients shown with the data can be seen as a real relationship present between the variables.

Unlike Table 3, Chinese housing prices have a mixed result in regard to the coefficients in equations 8-13. Four of the coefficients for the sectors are negative, with the two positive coefficients having a very little impact on the sectors. With an increase in the Chinese housing index, the real estate and consumer staples sector rose ever so slightly with the other sectors losing share price points instead. This is a big deviation from what was shown with the S&P 500 result which compared against the housing prices strictly showed a coefficient of 103.2 and was very statistically significant. With

worldwide companies being involved in consumer staples like Coca-Cola and PepsiCo it is surprising to see that the rise in residential prices equals such a small gain in price share, considering PepsiCo's presence in China alone. Another statistic that stands out is industrials having the worst coefficient losing an average of 2 share points every time the Chinese housing market index increases. With GE being a representative in the industrial data it has been operating in China over the past 30 years and has continued to grow and operate within the area. To have them losing money when housing prices and real estate are increasing is interesting to note and surprising to see.

Next, looking at the U.S. interest rate and its effects on the sectors above, it is not surprising to see all of the data is statistically significant because the U.S. interest rate plays such an important role in how companies manage their cash flow and how investors tend to invest. According to the data above the industrials, consumer discretionary, and real estate sectors had the best coefficients with all of the coefficients being positive. Real estate having a higher share price has the most logical argument attached with it because real estate companies can charge higher interest rates with the selling of land and earn more money out of it. With industrials it is again surprising to see the coefficient that followed the regression. Having the coefficient be the highest share increase along with being significantly significant indicates that consumers spend more of their money on more common goods such as household appliances and other manufacturing goods enabling them to be one of the bigger benefactors due to rising rates. Next, China GDP, like before, has virtually no impact on the sectors as the coefficient is too small to be regarded as data that can make an impact. With a three and three split on the coefficient being positive or negative the regressions in Table 4 do have one more negative

coefficient than in Table 3, but that remains the only difference from a data perspective as both suffered from the same problem of China GDP being too big to make a true impact on the sectors share prices.

With U.S. investor sentiment, the coefficients that were a result of the data came out all positive ranging from substantial growth in the industrials sector to minimal growth in the communication services and utilities sectors. The industrial sector showed the most growth as investor sentiment is very important for their growth as a sector and for the companies within the sector. With a lot of people having an eye out for the future this sector performs best when confidence is high because there will be more manufacturing and shipping of products across the country. If investor confidence is low then, people will be more money conscious and save instead of spending money on goods and services. As is the case with all the sectors in Table 4, investor confidence being high enables them to get more money through investments and overall spending allowing the growth of the share price. Following sentiment, China unemployment rate has positive coefficients with all the sectors except for industrial and has three significant statistics among the regressions. Consumer staples, real estate, and consumer discretionary all developed coefficients that are significant by nature and can be taken as very accurate statistics. When the unemployment rate in China is better, those three sectors are able to take the best advantage of it by improving upon their situation. Real estate, with a coefficient of 37.20 has the best share price gains among the group. Logically, with less people being unemployed more people are able to buy real estate with more people spending their money on real estate. The companies have more money coming in from the sales of the property, but also the interest as well.

China CPI was also able to produce all positive coefficients with four of the sectors having statistically significant results with communication services having the highest level of significance. Unlike in Table 3, these coefficients have significant values potentially because of these sectors' significance within the Chinese economy and the basket of goods that the CPI is measured by. Specifically in the communication services sector, AT&T has been able to come to agreements with China Telecom that allows them to operate more efficiently within China than previously. When the CPI increases people spend more money on services like communication services that AT&T operates under and allows the sector share price to increase as they are a major player within the sector.

Following CPI, U.S. inflation as seen in Table 3 has a big impact on the sectors being measured with five out of the six sectors having statistically significant results and all of them being positive. As is the case with most U.S. companies, the inflation rate is going to have a big impact on how their profit margins end up doing and how much money they may receive from institutional and individual investors. When the U.S. inflation rate increases all of these sectors are able to charge more for their goods and services due to the price hike that naturally follows an inflation increase. Due to this, people will be spending more money on their goods and services enabling all of the sectors in Table 4 to profit off of this and gain in share price.

Lastly, the Chinese interest rate produces all negative coefficients with no significant statistics which is similar to what was seen in Table 3, but not identical. Ranging from low to high losses on share price with an increase of the Chinese interest rate, it created an increase in the borrowing cost of these companies to operate and sell their products within China. As such, their profit margins become smaller, and investors

take notice of this and decide to not invest as much money due to an increase in expenses and a lowering of the potential revenue. To operate in China comes as a cost and the consumer services and discretionary sectors take the biggest hit out of the sectors looked at in Table 4.

Variables	8	9	10	11	12	13
	ind	cons	utilites	re	cond	comms
chnhp	-2.034 (-1.80)	0.222 (-0.52)	-0.178 (-0.83)	0.509 (0.63)	-0.224 (-0.21)	-0.0276 (-0.24)
usir	16.85*** (-7.04)	2.920** (-3.25)	2.170*** (-4.79)	4.711** (2.77)	5.417* (2.43)	1.733*** (7.09)
chinagdp	-4E-12 (-0.52)	-6.28E-12 (-0.97)	1.25E-12 (-0.93)	-4.38E-12 (-0.87)	9.61E-12 (1.45)	1.12E-13 (0.15)
usinvsnt	22.13 (-1.26)	4.31 (-0.66)	0.651 (-0.2)	2.524 (0.20)	2.362 (0.14)	0.705 (0.39)
chinaur	-9.673 (-1.01)	11.26** (-3.13)	1.854 (-1.02)	37.20*** (5.47)	25.65** (2.87)	1.155 (1.18)
chnpci	5.245 (-1.98)	2.975** (-2.99)	1.365** (-2.72)	4.747* (2.52)	1.021 (0.41)	1.048*** (3.87)
usinf	6.487* (-2.63)	1.949* (-2.11)	1.082* (-2.32)	4.940** (2.83)	7.813** (3.41)	0.319 (1.27)
chnir	-2.742 (-0.20)	-4.304 (-0.86)	-3.629 (-1.43)	-9.05 (-0.95)	-19.53 (-1.57)	-1.729 (-1.27)
constant	-121.8 (-0.63)	-262.2*** (-3.62)	-81.39* (-2.22)	-539.9*** (-3.94)	-160.6 (-0.89)	-74.55*** (-3.78)
N	67	67	67	67	67	67
t statistics	in parentheses					
	* p<0.05, ** p<0.01, *** p<0.001					

Table 4. Regression Results for Equations 8-13

C. Further Discussion of the Results

Circling back to the hypothesis, which was that there would be a solid relationship among the S&P 500 and the sectors with the Chinese housing market, the results can now conclude that this hypothesis was correct in its prediction. Out of the 13 regressions run, 8 of them turned out positive coefficients creating a positive linear relationship with the housing prices with the essential equation being the high number at 103.2 index points

increase every time the housing index increases. Furthermore, all of the negative results that came out of the regressions 2 of the 5 had reasonable dips in performance, so although the relationship might not be a positive one there is still a solid foundational relationship between the sectors and the housing index. The only sector where the housing index proved to have no effect and thus practically no relationship was the communication services sector where the coefficient was less than .1 indicating that the housing index had no effect on the sector share prices.

This positive coefficient of the essential equation along with the scatter plot that shows the linear relationship with the housing index is enough evidence to say the hypothesis was proven correct and there is a foundational relationship between the S&P 500 and 10 out of the 11 sectors.

D. Policy Implication of the Results

Mentioned in the introduction, a policy implication based on the results could be introducing more checks and balances into the foreign direct investment to attempt to limit the reliance on each market to create more capital. With the results the research has produced, those checks, and balances would not be necessary in order to ensure an eventual total collapse occurs. With a little over half of the regression producing positive coefficients and the rest negative, if a collapse were to occur only half of the sectors would be affected and stop producing those positive results. Furthermore, if the checks and balances were in place and a collapse were to occur it would be harder for investors to withdraw their money from the assets being affected. Living in the free market economy with few barriers enables an investor to easily withdraw and invest somewhere else where if a collapse were to occur they would be able to take advantage of the shift in

asset prices and not be left out of the eventual rebound. The average investor is what should be considered when deciding a policy and the best thing for them is to negate the policy proposal earlier in the research based on the results of the regressions.

Chapter 8: Conclusion

Over the past couple of months, the state of the real estate industry has been becoming increasingly worrisome as the larger development companies start to falter with the Evergrande Group being the tip of the iceberg. According to the reports from the National Bureau of Statistics, sales of homes were down 43% year to year and the trend is supposed to continue throughout 2022 with the demand for homes within China not being as high in recent years. Yan Yuejin commented that, “Sales won’t recover any time soon unless some fundamental changes are made to the even though we saw some relaxation in policies late last year to support the sector.” when talking about sales of homes within major cities in China. In the past few months, this type of loss has been constant across China with the Evergrande Group defaulting on its debt and getting it pushed back came as the first warning sign. With the loss of demand within the usual red hot housing market within China, these results and the conclusion that is discussed will be important for investors and the market as a whole as being able to understand a slight difference in the market can make a huge difference.

Using data obtained from April 2005 to October 2021, 13 regressions were run with 67 observations in each regression. What was found from these regressions was that there is a significant impact with the S&P 500 and the majority of sectors all having positive gains from an increase in the housing index. As shown in the scatter plot this relationship with the S&P 500 proves to be a significant positive relationship over the

past 16 years with both variables increasing in value and number as time has progressed. Furthermore, this linear relationship is proven to be substantially accurate given its statistically significant coefficient that was attached to the essential equation when the regression was run. A coefficient of 103.2 is very high by nature as the S&P 500 currently 4348.87 as of February 20, 2022 and represents roughly 2.3% of the total S&P index price point. With an increase in housing prices, having the index rise by 2% is something that an investor can take advantage of and invest in when the housing market is hot in China. However, given this statistical analysis, due to the linear relationship of the main variables when the housing market starts to drop that means that the S&P 500 will drop as well. While this analysis was not analyzed it can be inferred because of the best fitted line and the regression that was run. While it might not drop by the amount that it increases, the linear relationship shows it drops by a certain amount and would be damaging to the average investor.

As mentioned before, the housing market in China has been dropping in recent history and does not look like the hot streak that it has been on will continue into the future. Due to this nature, it could be the first sign of the housing bubble that has built up over the years starting to burst and collapse onto itself. The impact of the housing bubble bursting could be tremendous if it were to do so. As discussed above the relationship of housing prices in China and the S&P 500 is linear in nature and because of this if the housing prices were to start to drop, so would the S&P. While certain sectors might benefit from this collapse, the majority of the sectors would suffer, and the main index of the U.S. would suffer the most and because of this it would be disastrous for the U.S. market as slight variations within the markets often lead to volatility. With the eventual

collapse of the housing market appearing to be on the rise, what can the average investor do to ensure that they can ensure prosperity into the future?

First thing is to avoid the S&P or other major indexes. With major indexes like the S&P containing a multitude of companies this seemingly safe bet would not prove well as the companies within the index of the S&P are intertwined with each other and the housing market as the research has shown. With assets and investments across the world the downfall of one of the stronger investments from the prior 16 years would be worrisome for institutional and individual investors alike. Second, is to take advantage of the analysis done in the paper and invest in the sectors that would perform well if the housing market were to collapse in China. While the healthcare sector has a positive coefficient because of its industry a collapse of the housing market would not affect it as much as other sectors. Not only does it have one of the smaller coefficients indicating it is not as affected by housing prices, but it also offers goods and services that we need on a daily basis even if a crisis were to occur. With many other companies and sectors losing money because of the decrease in assets because medicine, vitamins, etc. are something that we need every day the healthcare sector would remain at a high level and continue to perform if a recession were to occur due to a drop in housing prices.

Lastly, investors can use the information to short potential companies or sectors in the event the housing bubble collapses in China. Shorting involves predicting the downfall of a stock within the market and selling off the assets before the company starts to take a downfall. As a lot of these companies within this research have ties and rely upon the Chinese housing prices to get some profitability, by looking at the companies that have the most ties would be the companies to short. By the research done here they

would be mainly the information technology and real estate sectors. Shorting companies within these sectors can help out the average investor and help them outperform any competitors with a potential housing crisis in China in the near future.

Into the future, there are different options that this research can be expanded upon to allow for future exploration of how the Chinese housing prices and the U.S. stock market relate to each other. First, is to look at how the rise of corporations like Amazon and Tesla have impacted the market. With their sudden rise, including them into the dataset would have produced skewed results with those companies controlling most of the weighted average for their sector. However, they are too big to ignore with the housing market in China on the brink of collapse and they are some of the companies that have invested overseas into the housing market. By doing case studies of these types of companies, it would further the research done here into how the two variables are connected.

Another avenue of future research is to weigh the impacts of different development companies within China and analyze them against the U.S. stock market as the other variable. As described above, the amount of people in China has slowly declined over the early part of 2022 and the latter part of 2021. Due to this, there are companies outside of the Evergrande Group that could start to feel the pressure of defaulting and being unable to pay off their debt. By going to the development companies, themselves and analyzing their investments and weight they hold, it would paint a much clearer picture of what could happen if a collapse were to occur to the housing market in China. With these two different areas of research, it would help expand

upon the research done here and give even more insight into how two of the biggest economies in the world are connected.

Through the research done in this paper, it has established a strong linear connection between Chinese housing prices and the U.S. stock market, specifically the S&P 500. As the housing market within China continues to go into unfamiliar territory with less properties being sold and managed than in the recent future, there is a potential for a sudden bursting of the bubble in Chinese real estate. If the bubble were to burst the average investor would be at a disadvantage due to the unfamiliar nature of the housing market within China and how it may affect their investments in the U.S.. However, by using the research done in this paper and following the advice outlined for them the average investor will be able to beat the market and secure profitability and prosperity even if the bubble suddenly bursts.

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Chapter 10: Appendix

	finance	chnhp	usir	chinagdp	usinvst	chinaur	chnpci	usinf	chnir
finance	1								
chnhp	-0.4155	1							
usir	0.927	-0.368	1						
chinagdp	-0.5601	0.8685	-0.5147	1					
usinvst	0.0654	0.0057	0.0279	0.0617	1				
chinaur	-0.0947	0.7711	-0.08	0.6409	-0.107	1			
chnpci	-0.5894	0.859	-0.5511	0.9939	0.0377	0.6186	1		
usinf	0.4449	0.0348	0.3644	-0.1278	0.0391	0.0017	-0.127	1	
chnir	0.3959	-0.565	0.326	-0.5108	-0.0427	-0.4383	-0.4772	0.4381	1

Table 5. Correlation Matrix for the Finance Sector

	tech	chnhp	usir	chinagdp	usinvst	chinaur	chnpci	usinf	chnir
tech	1								
chnhp	0.8545	1							
usir	-0.1755	-0.368	1						
chinagdp	0.7695	0.8685	-0.5147	1					
usinvst	-0.016	0.0057	0.0279	0.0617	1				
chinaur	0.8342	0.7711	-0.08	0.6409	-0.107	1			
chnpci	0.7549	0.859	-0.5511	0.9939	0.0377	0.6186	1		
usinf	0.1936	0.0348	0.3644	-0.1278	0.0391	0.0017	-0.127	1	
chnir	-0.4049	-0.565	0.326	-0.5108	-0.0427	-0.4383	-0.4772	0.4381	1

Table 6. Correlation Matrix for the Information Technology Sector

	hc	chnhp	usir	chinagdp	usinvst	chinaur	chnpci	usinf	chnir
hc	1								
chnhp	0.8711	1							
usir	-0.2814	-0.368	1						
chinagdp	0.8619	0.8685	-0.5147	1					
usinvst	0.0382	0.0057	0.0279	0.0617	1				
chinaur	0.7477	0.7711	-0.08	0.6409	-0.107	1			
chnpci	0.8499	0.859	-0.5511	0.9939	0.0377	0.6186	1		
usinf	0.1429	0.0348	0.3644	-0.1278	0.0391	0.0017	-0.127	1	
chnir	-0.4411	-0.565	0.326	-0.5108	-0.0427	-0.4383	-0.4772	0.4381	1

Table 7. Correlation Matrix for the Healthcare Sector

	re	chnhp	usir	chinagdp	usinvst	chinaur	chnpci	usinf	chnir
re	1								
chnhp	0.8892	1							
usir	-0.2551	-0.368	1						
chinagdp	0.8808	0.8685	-0.5147	1					
usinvst	0.0001	0.0057	0.0279	0.0617	1				
chinaur	0.8168	0.7711	-0.08	0.6409	-0.107	1			
chnpci	0.8735	0.859	-0.5511	0.9939	0.0377	0.6186	1		
usinf	0.0869	0.0348	0.3644	-0.1278	0.0391	0.0017	-0.127	1	
chnir	-0.4445	-0.565	0.326	-0.5108	-0.0427	-0.4383	-0.4772	0.4381	1

Table 8. Correlation Matrix for the Real Estate Sector

	cond	chnhp	usir	chinagdp	usinsnt	chinaur	chncpi	usinf	chnir
cond	1								
chnhp	0.8684	1							
usir	-0.2659	-0.368	1						
chinagdp	0.8997	0.8685	-0.5147	1					
usinsnt	0.0473	0.0057	0.0279	0.0617	1				
chinaur	0.749	0.7711	-0.08	0.6409	-0.107	1			
chncpi	0.884	0.859	-0.5511	0.9939	0.0377	0.6186	1		
usinf	0.0881	0.0348	0.3644	-0.1278	0.0391	0.0017	-0.127	1	
chnir	-0.4689	-0.565	0.326	-0.5108	-0.0427	-0.4383	-0.4772	0.4381	1

Table 9. Correlation Matrix for the Consumer Discretionary Sector

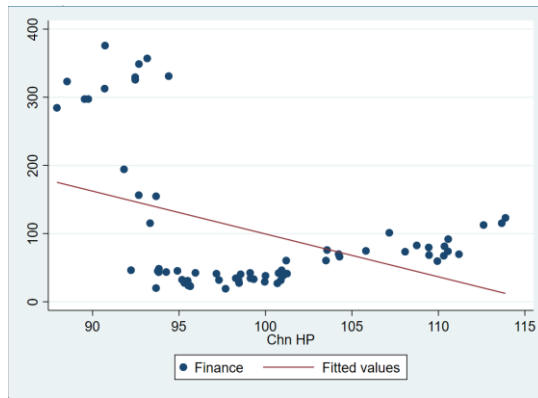


Figure 3. Scatter Plot of the Finance Sector and China Housing Prices

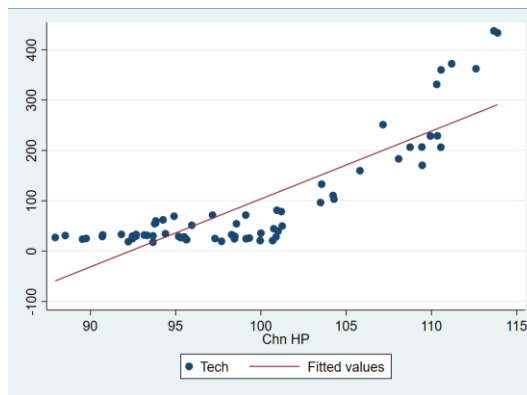


Figure 4. Scatter Plot of the Information Technology Sector and China Housing Prices

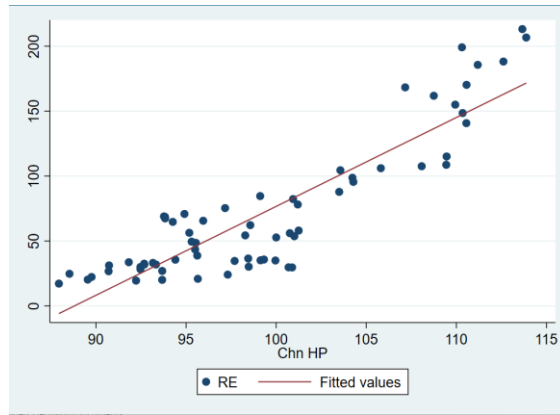


Figure 5. Scatter Plot of the Real Estate Sector and China Housing Prices

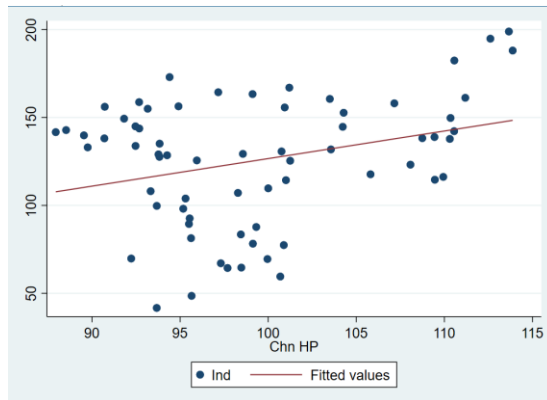


Figure 6. Scatter Plot of the Industrials Sector and China Housing Prices