The Correlation between the 1990s Dot-Com Bubble and the 1998-2006 Housing Bubble

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Abstract

The manifestation of the 1990s *dot-com bubble* and 1998-2006 *housing bubble* and their subsequent bursts catalyzed the worst financial crisis that the United States has experienced since the Great Depression. These "bubbles" are defined as such because of their nature as market episodes in which prices are not reflected by their fundamentals; instead, they are driven by speculative activity. Despite the chronological proximity of these two financial events (the dot-com bubble started in 1997 and the housing bubble in 1998) and the many factors that link them as a chain-reaction episode, academics and professionals in the field of economics regard them separately suggesting that there is no causation – or even a correlation – between the two. This paper argues that a correlation between the dot-com bubble and the housing bubble indeed exists, evident in the examination of the nature of a bubble's development in its specific sector, and through the analysis of certain market fundamentals. Comprehension, fuller understanding, and awareness of plausible events such as the emergence and/or the progression of a bubble and its implications are necessary in securing the economic stability of a society by improving the decision-making of the major market participants.

Introduction

Between 1991 and 2006, the world witnessed two financial episodes in the U.S. economy that drove it to its worst financial crisis since the Great Depression. These are the 1990s dot-com bubble and the 1998-2006 housing bubble. As these *bubbles* progressed, their main market participants believed that both the valuation of high-tech companies and houses prices, respective to their corresponding bubbles, would keep increasing. Both of these events ended as these markets could not sustain the level of activity or expectations that were invested in them.

This investigation seeks to find a correlation between the 1990s dot-com bubble and the 1998-2006 housing bubble through the analysis of their respective market fundamentals. And the analysis is carried out by interpreting and finding a relationship specifically between the numerical figures in the NASDAQ Composite Index, the Housing Price Index, the total number of IPOs and high-tech IPOs per year as a function of time, and the level of private investment spending put forth towards the housing market.

Despite the many interpretations (and/or definitions) of *bubbles* presented in literature, and for the purposes of this investigation, I define the term *economic bubble* as a market episode in which asset prices: (1) do not reflect the intrinsic value of the asset at hand, and cannot be explained or interpreted through fundamentals (interest rates, gross national product, inflation, unemployment) and (2) experience a sharp rise – often triggered and/or sustained by speculative activity – that can be followed by a sudden collapse; which generally leads into a financial crisis. Moreover, *economic fundamentals* are those factors (such as interest rates, savings rates, gross national product, inflation, among others) that help analysts predict the course of an economy.

In order to be able to make a claim that there is some correlation between the dot-com bubble and the housing bubble, some background information regarding these two events has to be introduced first. The next section is divided into three parts that present relevant literature pertaining the 1990s dot-com bubble and the 1998-2006 housing bubble, respectively; and the objective is to provide a basis from which the interpretation of the data put forth (in the data and analysis sections) can be better understood.

Literature Review

An Overview of the Dot-Com Bubble

In the "Dictionary of Finance and Investment Terms" (2006), John Downes and Jordan Elliot Goodman define the entry *dot-com* as "an Internet-related stock, such as Amazon.com." Therefore, and as common sense may suggest, the dot-com bubble constituted a speculative bubble in the Internet sector. This event was characterized by a strong over-valuation of the high-tech sector between the years of 1997 and 2001, which can be appreciated by regarding the NASDAQ Composite Index between these years. Downes and Goodman (2002) also define *NASDAQ Stock Market* as "the first and world's largest electronic stock market listing more than 3,200 companies, operated by Nasdaq Stock Market, Inc., which is partially owned by the NATIONAL ASSOTIATION OF SECURITIES AND DEALERS (NASD)." The main purpose of the NASDAQ Composite Index is to show, in relative terms, the overall valuation of publicly-held companies in the high-tech sector.

Another aspect that is characteristic of the dot-com bubble is the higher-than-normal amount of IPOs that took place as a function of time around the world. In his paper, "Initial Public Offerings" (1998), Jay R. Ritter defines an IPO (initial public offering) as an event that

"occurs when a security is sold to the general public for the first time, with the expectation that a liquid market will develop." He also explains that "most companies start out by raising equity capital, at some point the firm generally finds it desirable to 'go public' by selling stock to a large number of diversified investors." Provided that, between 1998 and 2001, 678 high-tech firms went public (through the IPO process) in the United States and 361 in Europe (Aiij and Brounen 2002), and soon after the bubble burst these quantities dropped dramatically. In "High-Tech IPOs in the US, UK, and Europe after the Dot-Com Bubble" (2009), Frank Nagle and Keith Pilbeam consider it important to observe the fluctuations of the average first-day returns of the IPOs that took place before, during, and after the dot-com bubble. Their analyses suggest that after the dot-com bubble burst, these average first-day returns plummeted along with the number of companies that went public. But the factor that sets the basis for this outcome is the fact that, during the dot-com bubble, the average first-day returns reached abnormally high figures such as that of 63% in the United States (Aiij and Brounen 2002).

Having provided some important details about the high-tech sector during the years of the dot-com bubble, the next section presents some background information about the housing market during the years of the housing bubble.

An Overview on the Housing Market

As the debate progressed on whether or not the housing market was going through a speculative bubble, Paul Krugman (2005) was among the first to state that the housing bubble of the time was coming to the end. In his article, Krugman argues that when it comes to house prices "the United States is really two countries, Flatland and the Zoned Zone." He explains that "in Flatland, which occupies the middle of the country, it's easy to build houses [because of the availability of land;]… as a result, housing prices are determined by the cost of production." On

the other hand, he refers to "Zoned Zone" as the land that "lies along the coasts, [where] a combination of high population density and land-use restrictions makes it hard to build new houses." Therefore, when buying a house becomes easier

> because of a fall in mortgage rates, some houses get built, but the prices of existing houses also go up. And if people think that prices will continue to rise, they become willing to spend even more, driving prices still higher, and so on. In other words, the Zoned Zone is prone to housing bubbles.

> Christopher Thornberg (2006) goes more into detail as to why the housing market

actually exemplified a bubble. He explains that the real rate of appreciation of house prices in the United States has been about .2% over the last one-hundred years, suggesting that the appreciation of house prices at a rate of 10% over the years of 2004 and 2005 represents a "huge bubble [in]… real terms." He also presents and interprets market fundamentals such as unemployment rates and savings rates and explains that house prices did not move accordingly, for which reason the housing market embodied a speculative bubble.

Alluding to the primary objective of this paper, the next section presents how academics in the field of economics attempt to explain the causes for economic bubbles, and how they often fail at connecting them to other financial events in order to identify chain-reaction events.

Failing to Connect the Dots

Many academics in the field of economics try to find explanations for infamous events such as the 1997-2001 dot-com bubble and the 1998-2006 housing bubble, which preceded the worst financial crisis that the United States has encountered since the Great Depression in the 1930s. It is interesting to notice that, despite their similar nature and sequential proximity, very little literature suggests a correlation between these two chronologically-overlapping financial episodes.

A perfect example of this type of literature is presented in "The Dot-Com bubble, the Bush Deficits, and the U.S. Current Account," by Art Kray's and Jaume Ventura. The authors' approach in this article is to suggest explanations to the national financial chaos originated by the dot-com bubble, which they argue was caused and/or maintained by fiscal policy under Bush's administration. Even though this article was published a little over a year before the United States housing market crashed, it mentions nothing about the housing market presenting a bubble-like behavior or at least abnormally high house prices across the country. Much worse, it fails at regarding the anomalous behavior of the housing market as a possible cause for the U.S. current account.

Yochanan Shachmurove presents a different analysis regarding the causation of the dot-com bubble in his paper "Reoccurring Financial Crises in the United States." Instead of blaming the dot-com bubble or any other financial episode of this nature on fiscal policy, he argues that "financial crises, booms and busts are an inherent part of the capitalist system." And even though he utilizes data to identify common patterns that financial crises usually portray, including specifically listing and describing both the dot-com and housing bubbles, he disregards the notion that these two events could be linked on a deeper than they are perceived to be.

One exception to this apparent rule is Carlota Perez's work. In her article "The double bubble at the turn of the century: technological roots and structural implications" she argues that "the two boom and bust episodes of the turn of the century – the internet mania and crash of the 1990s and the easy liquidity boom and bust of the 2000s – are two distinct components of a single structural phenomenon." This "single structural phenomenon," which she labels as a Major Technology Bubble (MTB), is described to be a period of time that started in the 1970s with the invention of the internet and its expansion across the world, and that is supposed to end

anywhere between the 2020s and 2040s with the emergence of a different MTB. Although, Perez brings these two episodes together by arguing that they are components of a broader stage of globalization, she does not make an attempt to find a cause-and-effect connection – or at least some correlation – between the two.

In order to state that there is a correlation between the dot-com bubble and the housing bubble, it is important to first point out their inevitably portrayed characteristics generated by their contrasting nature. Paul Krugman seems to have discovered one of these differences as it happened. On August 8th of 2005, he published an article in the *New York Times* arguing that the United States was in the midst of a speculative real estate bubble, but that since the housing market did not behave exactly like technology bubbles it was not supposed to be obvious. He explains that housing bubbles, contrary to stock prices, move very slowly – to the point where even after the "housing boom goes bust" prices keep rising. This can be corroborated by comparing the time spans of the dot-com bubble and the housing bubble: four against eight years, respectively.

The following section contains data that is necessary to analyze the correlation between the 1990s dot-com bubble and the 1998-2006 housing bubble. These sets of data constitute market fundamentals for their respective sectors and include the following: the overall valuation of the high-tech sector between 1994 and 2005 (NASDAQ Composite Index), housing prices in the United States between 1991 and 2010 (Housing Price Index), the amount of IPOs and high-tech IPOs as a function of time between 1985 and 2007, and the amount of investment spending towards the construction of new houses in the United States between 1995 and 2010 (Real Private Fixed Residential Investment).

Data

The collection of data that most explicitly conveys the anomalous behavior of the high-tech sector between the years of 1997 and 2002 is the NASDAQ Composite Index.

Figure 1

NASDAQ Composite Index (1994-2005)
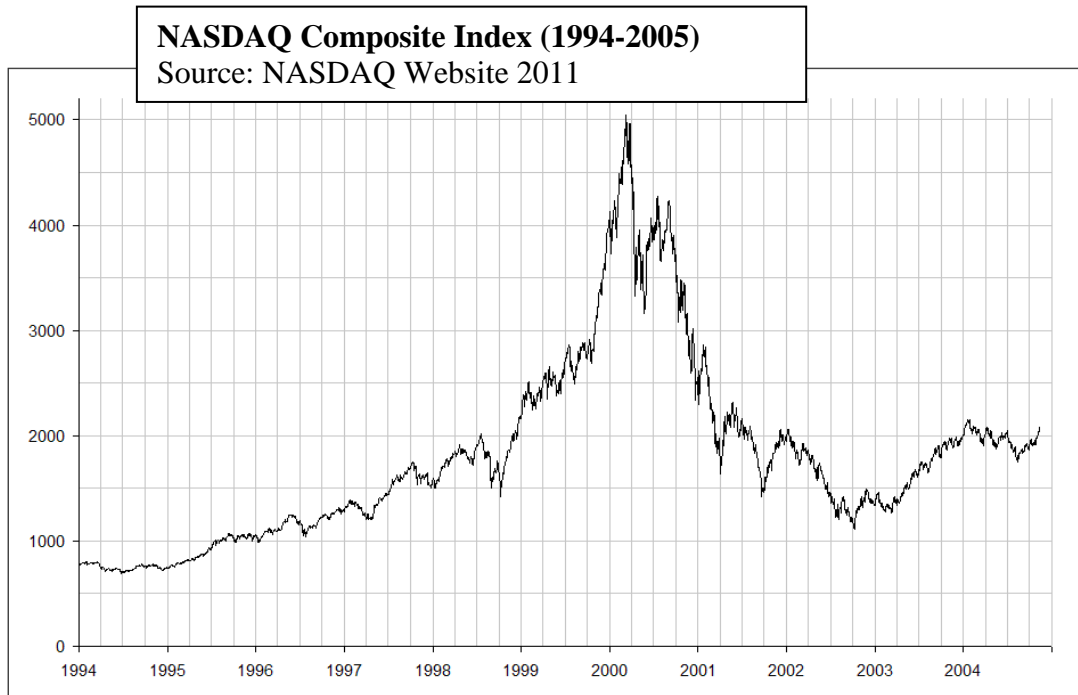Source: NASDAQ Website 2011

Figure 1, the NASDAQ Composite Index (1994-2005), demonstrates an overall valuation of the high-tech market of about one-thousand points from the 1994 to mid 1996. This span of a little over two years shows very minimal appreciation. Figures start to exalt in 1997, however, and they sky-rocket from 1419 points on the 8th of October of 1998 to a staggering 5,132.52 points on March 10th of 2000. The first strong signs of depreciation (after the peak on March 10th) took place on the 14th of April of 2000, as the number of points lowered to 3321.29. It was not until March 12th of 2001 however that the collapse of the high-tech market became evident, when the number of points fell extensively to 1922.78. On April 4th of 2001 it hit another low point at 1638.80, and on October 9th of 2002 it hit 1114.11 – its lowest point since August of 1996.

The data that corresponds with the NASDAQ Composite Index in terms of the housing market is the Housing Price Index. Below is the United States (seasonally-adjusted) Housing Price Index from 1991 to 2010 (having 1991 as the base year).

FIGURE 2

Housing Price Index (seasonally adjusted) 1991-2010
Source: FHFA Website (2011)
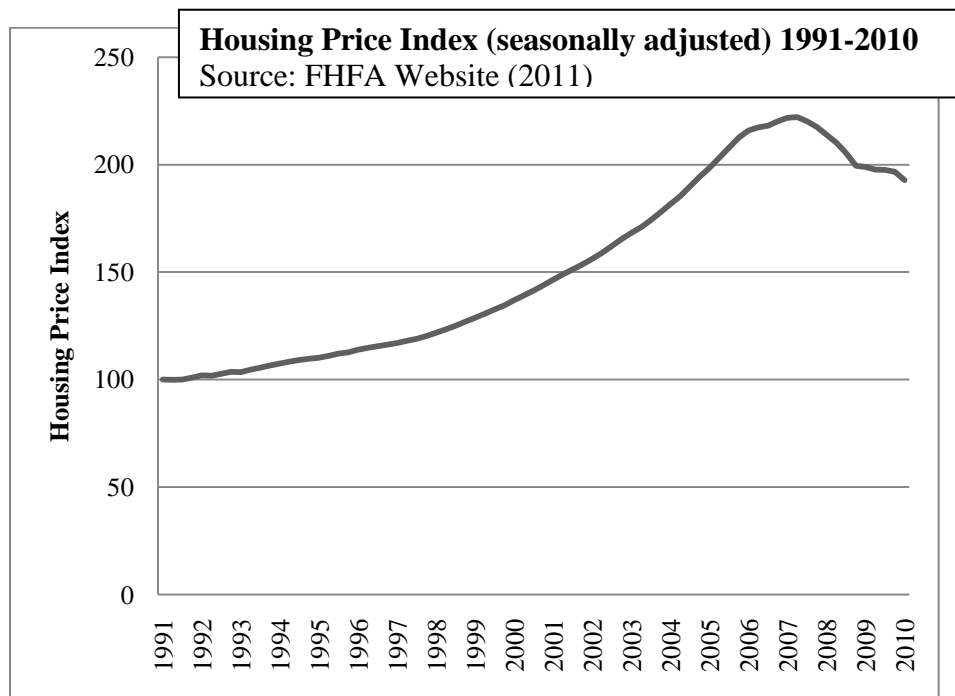
As Figure 2 shows, housing prices experienced a consistent – nominal appreciation of about 2.65 percent per year from 1991 to 1997. Starting in 1998 however, it is noticeable that the *rate of appreciation* of house prices itself increases, to the point where house prices as a function of time depicts an exponential curve more than a constant line. House prices, between 1998 and 2006, increased at an average rate of seven percent, in 2004 showing the maximum slope at 9.26 percent per year.

Another set of data that shows the amount of activity in the high-tech stock market is the amount of private firms that decide to go public through the IPO process. Below is a chart that

shows both the total number of IPOs and the number of NASDAQ IPOs in the United States

between the years of 1985 and 2007:

FIGURE 3

Number of IPOs per Year in the United States (1985-2007)
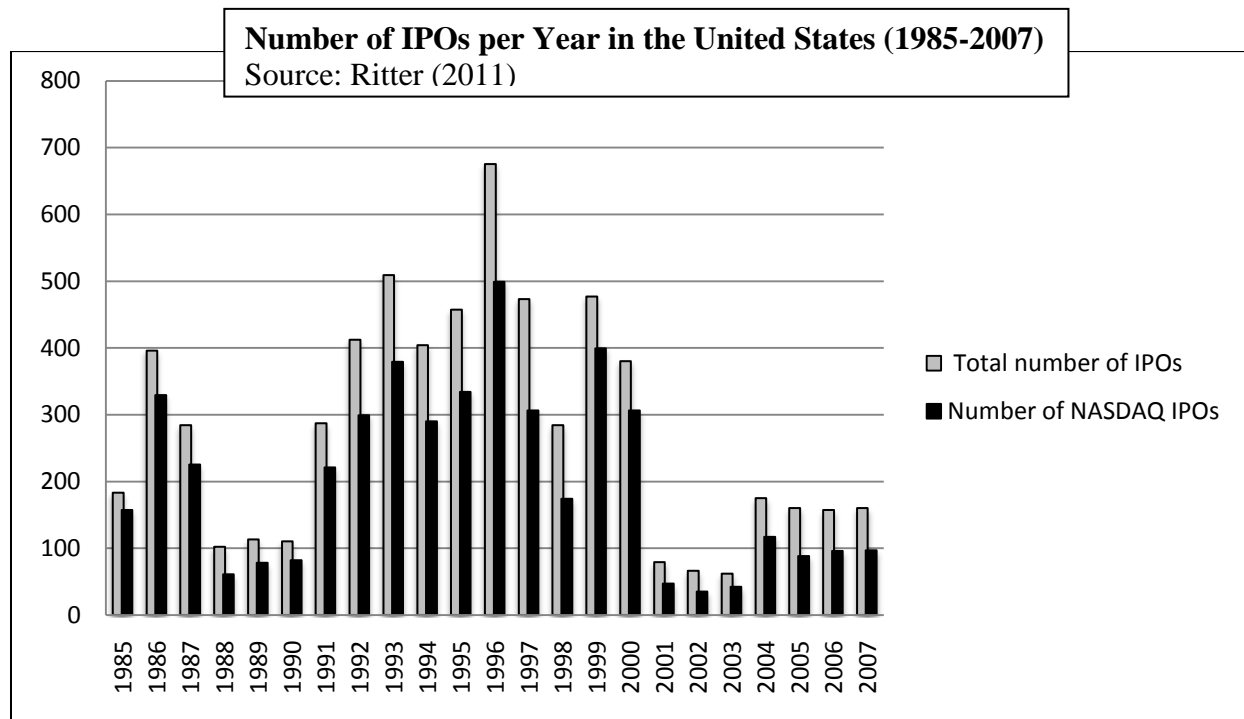Source: Ritter (2011)

Figure 3 shows the amount of total initial public offerings (between 1985 and 2007 in the United

States) as the light-grey bars; and the NASDAQ initial public offerings as the black bars (the

NASDAQ IPOs represent those high-tech firms that went public during this period of time).

Throughout the 23-year period regarded in Figure 3, the amount of high-tech (NASDAQ) IPOs

constituted an average of 69.93% of the total amount of IPOs. The five years in which the

number of high-tech IPOs is the highest as a percentage of the total amount of IPOs are 1985,

1986, 1987, 1999, and 2000 at 85.79%, 83.08%, 79.23%, 83.25%, and 80.53%, respectively.

Similarly, the five years in which the number of high-tech IPOs is the lowest as a percentage of

the amount of total IPOs are 1988, 2001, 2002, 2005, and 2007 at 59.80%, 59.49%, 53.03%,

55.00% and 60.63%, respectively. The chart also displays a sudden increase in the amount of

IPOs in the year of 1991 at 287 (differing substantially from the year of 1990 at only 110), and a

consistent growth of these figures thereafter. The three years in which the amount of IPOs was

the highest were 1993, 1996, and 1999, with 509, 675, and 477 IPOs, respectively. Likewise, the

three years with the lowest number of IPOs were 2001, 2002, and 2003, with 79, 66, and 62,

respectively.

The last piece of data to be regarded in this section is the Real Private Fixed Residential

Investment, which is the amount of investment spending put forth towards the construction of

new residential spaces and the renovation of existing ones in the United States.

FIGURE 4

Real Private Fixed Residential Investment 1995-2010
[Billions of chained (2005) dollars] Seasonally adjusted at annual rates
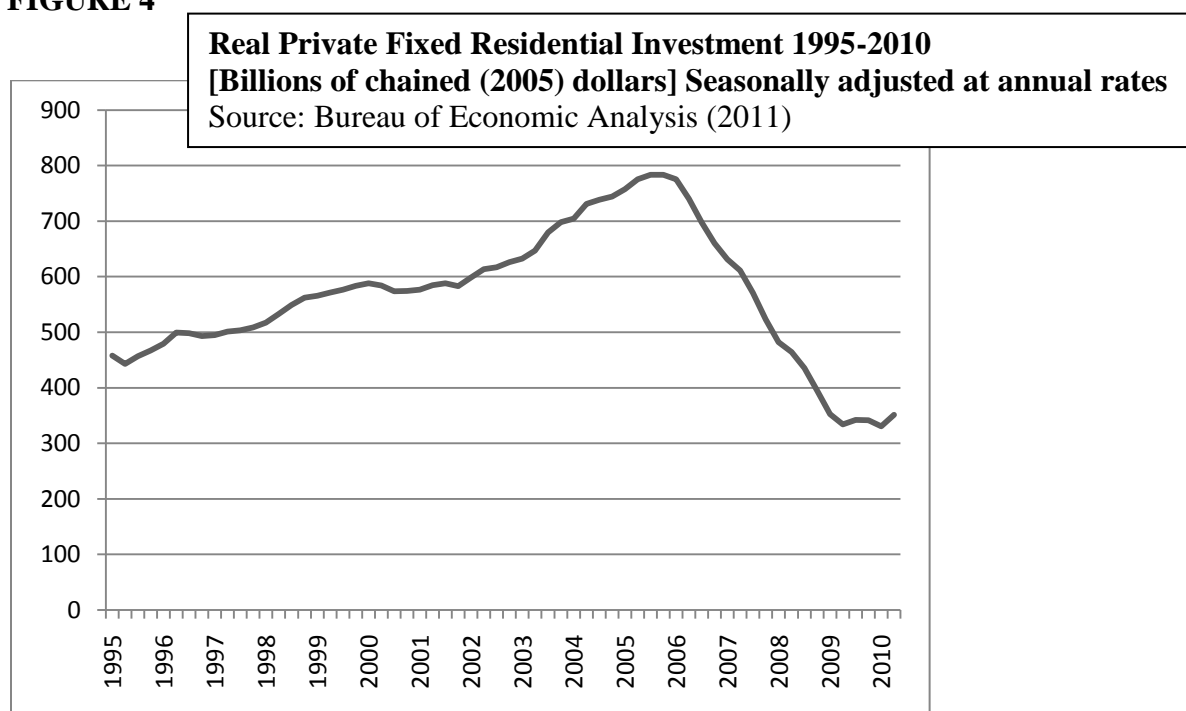Source: Bureau of Economic Analysis (2011)

Figure 4 displays the (seasonally-adjusted) real private fixed investment intended for the

construction of new houses from 1995 to 2010 in billions of chained (2005) dollars. There is a

steady appreciation of about 123 billion dollars in investment spending for the housing sector

from 450 billion dollars in 1995 to 573.3 billion dollars at the end of 2001. Furthermore, from

the year of 2002 to its peak of 783.5 billion dollars in 2005, this investment spending experienced an increase of 209.8 billion dollars. These figures decreased more rapidly than they had increased starting in 2006, and reached their lowest point (during the 15-year interval presented in the graph) of 333.9 billion dollars, which constituted a depreciation of almost 450 billion dollars over the span of three years.

Analysis

The significance of Figure 1 lies in the fact that it shows the overall valuation of the high-tech sector as a function of time. The rapid increase in the market valuation of this sector is evident as the figures start sky-rocketing abnormally in 1998. Even though the evident collapse of the high-tech sector on March 12th of 2001, along with the data presented for the years of the dot-com bubble, seems to be the most relevant information in Figure 1, it is in fact the overall valuation of the high-tech sector on October 9th of 2002 that is the necessary piece of data in this analysis in order to find a correlation between the 1990s dot-com bubble and the 1998-2006 housing bubble. The NASDAQ Composite Index shows that, on this date, the high-tech sector fell to its lowest point at 1114.11 (since August of 1996), a collapse of 78.3% from 5,132.52 points during its peak on March 10th of 2000. This becomes crucial when analyzing Figure 4 – the rate of investment spending towards the construction of new houses increased the most as the overall valuation of the high-tech sector decreased.

As Figure 4 demonstrates, from 1995 to the end of 2001, there was an appreciation of 123.7 billion dollars in investment spending towards the construction of new houses in the United States. This constitutes an average increase of 17.7 billion dollars per year over the course of this seven-year period. In 2002 however, when the high-tech sector reached its lowest

market valuation, investment spending towards the housing sector increased unprecedentedly. Between 2002 and 2005 there was, once again, an increase of investment spending towards the housing market – this time with an increase of 209.8 billion dollars. This is an average increase of 69.94 billion dollars per year over the course of this three-year period. These figures indicate that as the high-tech sector reached its lowest point (since August of 1996), the amount of money put forth towards the housing market increased at anomalous rates – suggesting a shift in investment spending from the high-tech sector to the housing sector.

The data presented in Figure 3 assists in corroborating this - as Ritter (1998) explains, capital has to be raised in order for companies to go public through the IPO process, regardless of what method they use. In other words, investment spending is needed for a company to go public before it can raise capital (for growth purposes) by selling its stock to the public. Furthermore, it is noticeable that the data presented in Figure 1 and Figure 3 exhibit a positive correlation – as the overall valuation of the high-tech sector appreciates, the number of IPOs increases, and vice versa. This suggests that the higher that the high-tech sector is valued, the more that high-tech firms decide to go public. And since high-tech IPOs constitute the majority of the total amount of IPOs that take place (an average of seventy-percent per year), the more that the high-tech sector is valued, therefore the more that firms in the overall economy go public. Now, as Figure 3 shows, the amount of investment spending put forth towards the high-tech sector plummeted in 2001 as fewer companies decided to go public. Furthermore, just as the high-tech sector reached its lowest overall valuation in 2002 (since 1996), the number of high-tech IPOs also reached its lowest mark at 35 (since 1985).

By recalling the data presented in Figure 4, it appears that not only does the investment spending towards the housing market increase the most as the overall valuation of the high-tech

market plummeted in 2002, but also as the investment spending. But, how does this reflect on the overall valuation of the housing market?

Figure 2 shows that house prices started rising abnormally in 1998 – marking the beginning of the housing bubble. The fact that the dot-com bubble burst in 2001 shows that the collapse of the high-tech sector did not start the housing bubble. There are contrasting arguments as to what were very the factors that first initiated both the dot-com bubble and the housing bubble. For the purposes of this investigation, the focus is rather on the behavior of the housing market as the high-tech sector collapsed. What the data suggests is that as both the valuation and the activity in the high-tech sector crumbled in 2002, the activity in the housing market increased at even a faster rate than it had when the housing bubble started in 1998. In other words, that the crashing high-tech sector intensified the investment spending and rate of appreciation of house prices.

Furthermore Figure 2 shows that the rate of appreciation of house prices reaches its highest point (in the interval of time presented) in the year of 2004. If the interpretation of the data in this paper suggests that the housing bubble was intensified by the collapse of the high-tech market, then the concept of *liquidity* explains why there was a delay of two years – from 2002, when the investment spending towards housing started sky-rocketing, to 2004, when the rate of appreciation of houses in the United States reached its highest point, at almost 10% per year in real terms. As the NASDAQ Composite Index shows, in Figure 1, the overall valuation of the high-tech market fluctuates much rapidly and intensely than house prices do, in Figure 2. This is because high-tech shares of stock – or any other type of stock traded in the stock market – are much more liquid than houses. In other words, it is not only easier to trade in the stock market, but it is also easier to find someone who is willing and able to trade stock with than it is

to buy or sell a house. Shares of stock are traded in high volumes in the stock market instantly, whereas selling a house requires much more work of marketing, and buying a house requires ensuring the satisfaction of those acquiring a home.

Conclusion

Even though the 1990s dot-com bubble and the 1998-2006 housing bubble are commonly regarded as two mutually exclusive events, the behavior of their respective market fundamentals shows a strong correlation between these two financial episodes. The analysis presented in this paper suggests that the collapse of the high- tech sector (both in its overall valuation and activity level) intensified the bubble that the housing market was going through. In other words, at the end of the dot-com bubble in 2002 there was a shift in market activity from this sector to the housing market.

A plausible explanation to this transition is that after the high-tech sector collapsed, investors sought a more secure sector to invest their money into. Furthermore, since the housing market represents a very stable sector (even though it does not grow substantially over the course of the years), investment spread, leading to a shift to this sector. Further research could assist more thoroughly in the explanation as to how these shifts in market activity work by regarding concrete financial episodes, such as the two analyzed in this paper.

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