Cash-Only Real Estate Transactions and Property Prices in San Francisco, California

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Abstract

In recent years, there has been the common shared belief that international investors and other buyers of real estate in cash-only transactions have exercised an upward pressure in property prices in the city of San Francisco in California, the consequence being the crowding-out on buyers requiring access to credit. This paper examines real estate prices and cash sales for the period beginning after the last recession to the year 2015, as well as other significant drivers since the year 1998. The results suggest a contradiction to the cash-only claim, at the same time that they reveal a strong relationship between the technology sector and the real estate prices in the city.

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1) *Introduction*

As it is well known, the years after the latest crisis saw a severe recession that later began to lose pace, with its official end announced as of June of 2009[1]. In the case of real estate prices, their low levels and lack of demand experienced during the crisis outlived the recessionary period, persisting well into the first half of 2012, that is, three years beyond the official end of the recession.

Concomitantly, mortgage interest rates began their descend towards their lowest level in the history of the United States, mainly as a consequence of monetary policy driven by high unemployment levels, with a minimum bound set at 3.35% by the end of the third quarter of 2012[2].

In this sense, the year 2012 marks a turning point in the real estate market in the city of San Francisco, California. Prices began their rebound, while interest mortgage rates continued to linger at their record low levels, with this optimistic scenario being reinforced by the gradual decrease in unemployment. The property market became favorable again, luring first time home buyers to turn their attention to the benefits of ownership in the light of increasingly competitive rental alternatives with a growing population and a higher number of technology companies motivated by the savings promised by the payroll tax exemptions[3]. The following graph set illustrates the price trends in the real estate market in the city.

[INSERT GRAPH SET 1 HERE]

As it can be seen from the graphs above, all property types and house tiers showed a sustained spark in prices well into the year 2015.

The Cash-Only Myth

A low mortgage interest rate environment appears favorable for families and individuals who seek to achieve first time homeownership. However, realizing this dream at the wake of the recovery was, contrary to expectations, as far as ever. At the year 2012 turning point, the fast and furious price growth created disillusionment among buyers in need of mortgage lines to access ownership, creating the "cash-only myth."

This belief was based on the recounts and reports by media, property agents, real estate experts, prospective buyers, sellers and consulting firms, all of which attributed the rise of prices and subsequent lack of

[1] NBER, 2010.

[2] Freddie Mac, Primary Mortgage Market Survey®

[3] This scenario will be covered further in this same section below.

competitive advantage by credit seekers to the so called "all-cash purchases," also referred to as "cash-only sales."

According to these statements and the subsequent belief that propagated in the city, the main reason for the continuous increase in property prices was the working of international investors who, in search of a "flight to safety," would flow large sums of cash into the city of San Francisco and other metropolitan areas in the United States in order to acquire units of real estate in a volume sufficient to move prices drastically upwards, generating estimated value increases in the city of San Francisco and the Bay Area of 60% to 70% from 2012 to the end of 2015[4]. The following graph set shows the portion of sales of real estate in cash in the city, as well as the property prices for all the tiers and property types.

[INSERT GRAPH SET 2]

Several newspaper articles and opinion pieces depicting the cash-only claim were said to be based on rumors and voice of experts, a number of which are listed as references in section 8. Moreover, an internet search can provide a myriad of titles indicative of the scenario described herewith, including positions in the early period (years 2012 and 2013) which were later reversed or changed substantially in 2015 and 2016[5].

The common story line runs as follows. Economic troubles abroad and the recessionary environment in Europe, accompanied by the shrinking economic activity in China, propelled the reallocation of cash surplus that could no longer be channeled through previous investment vehicles. The respective liquidity holders would then select the United States as its target due to the safety and luring rewards offered by the property markets in its major metropolitan areas, which included not only San Francisco, but also New York, Miami, Los Angeles and Seattle, among others.

Cash would then be applied as soon as possible by means of mass purchases of property, while wire transfers were thought to have been channeled in several cases through an intermediate city, such as Hong Kong.

[4] Paragon Real Estate Group (2016).

[5] See for example, McDermid (2016).

The result of the this word-of-mouth had the expected outcome of exercising a negative impact in wishful buyers needing to take credit, who would begin to experience the crowding-out effect in their lack of ability to compete against the cash-only offers that carried overprices of approximately 10 to 25%[6].

This unfortunate situation to borrowers and recounted by prospective buyers wanting to purchase homes through credit was reinforced by real estate agents and realtors, who volunteered stories about their own dealings with first time home buyers and with foreign investor clients. In particular, some of them would describe the addition of an international division with foreign language capabilities and open house excursions targeting the international, and presumably all-cash, clientele.

Another source of discomfort embedded in the all-cash rumor was attributed to the sudden holdings of large amounts of cash by employees, mostly of technology companies, whose employers had filed for their Initial Public Offerings (IPO's) in the previous years. Following approximate estimates and reports from media, major IPO's in the near past have turned a considerable number of company employees into wealthy individuals. As many as 863 stockholder employees in Facebook and more than 1,600 in Twitter are believed to have become millionaires upon these companies' respective public offerings of stock, while the average age of an employee in Twitter is thought to be 30 years (Smith, 2015).

This was another reason to reinforce the all-cash purchases belief and their detrimental effect to borrowers. In the case of wealthy employees, the original trigger was the city's payroll incentives offered to companies settling in the Central Market and Tenderloin areas in San Francisco in the years following the recession. The "Twitter Tax Breaks," as they are usually called, have motivated major companies such as Twitter[7], ZenDesk, Zynga, Yammer, Uber and others to choose the city for their main location. The result has been a considerable increase in the employee pool working in San Francisco with the subsequent increase in demand for housing[8].

[6] This piece of information is extremely hard, if not impossible, to assert given that only the final transaction price accepted by the seller is reported in the city records and real estate databases. Rejected offers and their documentation are discarded by the seller with no further ado, for which percentage ranges in regards to offer prices are obtained based on hearsay and commentaries as opposed to actual data.

[7] This is one of the first companies to have accepted the settlement in the undeserved neighborhoods in the city, hence the name assigned to the incentives.

[8] This measure was to lure employers conventionally settled in the San Jose and Silicon Valley area. Additionally, major companies in the Silicon Valley are running an increasing number of shuttle buses from and to the city every day to attract young talent supposed to be reluctant to live in the outskirts and who prefer what the city has to offer.

Some of these employees cashed their stock holdings in the short term following the IPO's, an investment decision that hypothetically allowed them to buy their first time home in cash while being very young, most of them in their 30's[9], with the consequence of pushing the price of real estate upwards by offering to pay prices beyond the asking threshold.

To further the cash-only myth, several real estate professionals commented on their experiences from the seller's standpoint. Their open houses would receive several visitors in one day[10], with tens of offers presented by potential buyers within the first hours from opening[11]. Some of these offers would come at a price that was comfortably beyond asking, which is paramount to aggressive competition, or as a real estate connoisseur would put it, to a "seller's market[12]."

In conclusion, the cash-only belief was driven by two principal actors who were to be assigned the responsibility of pushing prices upwards and for creating lack of competitiveness for borrowers, namely, international investors and employees from companies that had launched their IPO's recently. Both groups would enjoy enough liquidity to move market prices to a level unreachable for a homebuyer seeking credit.

However, the question that remains is: why would cash-only sales push prices upwards? Does the form of payment matter in the real estate market in San Francisco? The answer lays behind the contingencies present in the processing and closing of a real estate transaction, which will be treated in the following subsection and in section 3, in which the working hypotheses are stated and explained.

The Contingency Block

How could a first time homebuyer in need of borrowing cope with this aggressive demand environment? Not only was a credit seeker unable to beat the offering price set by the all-cash buyers, but also he or she could not

[9] Several discussions, protests and activities have arisen in the past few years as a consequence of the gentrification in the city. Some of these events involved the interruption by demonstrators of commuter buses traveling from San Francisco to the Silicon Valley and offered by major companies to their employees in protest for the exodus of a significant portion of the non-technology population to other Bay Area cities due to the rising cost of living.

[10] A real estate agent recently mentioned that an open house under their care received about 100 in-person visits in one day.

[11] A practice in a market crowded with buyers is to set up a timeframe in which the seller will receive and consider the offers, as opposed to obtaining them on an on-going basis. This is expected to increase room for negotiation, benefiting the seller by attaining a higher price under the peer pressure scheme explained in the following footnote.

[12] Some sales agents have the modus operandi of setting up a low asking price to induce a higher volume of offers, which is used as a peer pressure tool on the top prices to gain higher competitive advantage. As an example, a sale that received more than 20 concomitant offers provides more leverage to excite competition, while a property that has received only a few may lead the seller to become a price taker.

remove the main contingency in the transaction, which relates to the credit approval. Given that an all-cash buyer is not subjected to the loan underwriting process, shortening the times to close the transaction and providing assurances to the seller about the definiteness of the transaction was an advantage in favor of buyers with cash-in-hand[13].

For a credit seeker, the answer was between two stressful and, at times, inaccessible options. One alternative was to surpass his or her financial means by entering into higher nominals in their borrowing lines than expected for the same property, which would allow the credit buyer to match or exceed the all-cash buyer's aggressive offering price. This venue would not guarantee winning the offer, although it could enhance the chances of becoming a homeowner. However, for many borrowers this was not an option due to loan-to-value ratios, which were decreased as lending standards became stricter upon the crisis.

The second alternative was to abandon the aim of purchasing a home altogether, or to keep trying by attending open houses and by writing as many offers as possible within the sought price range[14]. In the end, it was perceived that, even in the lowest interest rate environment in the history of the United States, the dream of purchasing a home for the first time was unachievable for aspiring buyers seeking credit, a population that is usually associated with working families and individuals.

The present analysis arose from witnessing the scenario depicted so far. The main research question that it will attempt to answer is: what is the relationship between the all-cash purchases and the increase in real estate prices in the city of San Francisco? This question has not been asked by literature this far, although some theoretical incursions have been made related to the role of long term interest rates in real estate price fluctuations.

In the next section, the literature review is presented. Later under section 3, the research questions arising from this paper's contribution are stated. These questions are accompanied by the hypotheses and the determination of the unit of analysis. The units of observation are then described, which will shape the data and models to be used. The latter are detailed in section 4, which includes the variable correction strategies, and section 5, which

[13] The contingency feature in a real estate transaction will be considered in more detail under section 3, in the subsection dedicated to the hypotheses.

[14] Lately, a new resource by buyers has been to write a personal letter to the seller about themselves in order to attempt to convince the owner that they are a worthy candidate. Other buyers have opted for the creation of videos in which they show their families and even pets to try to motivate the seller emotionally. It is unclear whether these strategies are successful at all, with real estate agents providing diverse opinions and commentaries on the subject.

states and explains the econometric model. Results are then analyzed under section 6, while conclusions and suggestions for further research close the present work in section 7.

2) ***Literature Review***

Popular economic literature in the realm of sudden and sustained increases in real estate prices has aimed at searching for a definition of a housing bubble and at its prediction. As Mayer (2011) describes, research has been this far unable to find prediction models, let alone to state a clear definition of a bubble, while various viewpoints and assumptions prevail.

Lack of agreement or understanding in the definition of a bubble has led to uncertainty as to whether one may be taking place at a time when prices begin to trend upwards, which leaves the analysis of housing bubbles as an after-the-fact exercise.

The definition of a bubble in the real estate market often varies depending on the research aim and on the premises used. Regardless, they all include the common feature of sharp and upward trends in property prices followed by sudden and sustained declines, or of asset price volatility in a time period considered as short term (usually spanning a few years).

Based on this outline, the review of trends leads necessarily to analyses that are a posteriori. Sometimes, the statement "there is a bubble" may be heard or read from commentaries on the topic when prices are seen to increase substantially, but these are not usually issued by researchers or as economic analysis[15].

Therefore, "bubbles" are not a clear cut when the price movement is taking place and can only be identified after a crisis, a sudden downward trend or a recession has made the news and become evident usually by the inspection of indicators not directly related to the real estate market, such as those reflecting economic activity and unemployment.

Where the causes of a bubble are examined by literature, some of the most cited and studied sources of upward price trends relate to easiness of credit and down-payment and constrains in supply, among others. In the case of payment forms, borrowing capabilities and their regulatory landscape have been addressed in their role to

[15] In media, it may be found that an economist is interviewed as to the possibility of a bubble at the time of property price increases. However, most of these comments do not go beyond a general indicative outlook such as "it's getting a little bit bubbly" and does not constitute formal research. See the CNBC interview to Robert Shiller in December 2014 mentioned in Business Insider.

attract borrowers to incur in long term debt for the purchase of their homes. However, and to the best of the author's knowledge, cash-only transactions have not received attention until now.

For the most part, the connection between real estate prices and their form of payment has only been studied from the perspective of interest rate levels, which would presumably have an influence on asset prices via the demand for credit. However, this approach has been theoretical in nature, including the work by Shiller (2007), who concluded that a relationship between interest rates and asset prices could not be established due to the timing mismatch between 10-year government bonds spreads and real estate prices[16].

Other analyses about the influence on real estate prices from changes in interest rate levels affecting borrowing have not focused on interest rates as playing a main role as exogenous variables, but rather, have included them as model premises in asset pricing frameworks or as a macroeconomic factor in business cycle models aiming at forecasting booms and busts[17].

The City of San Francisco, California

In the case of San Francisco, although price trends have shown substantial increases in the last four years, it would seem risky to assess at this time whether a bubble has been forming. At the same time, the question related to the existence of a bubble is raised by the fact that, in most property tiers, prices in the years after the recession increased at higher rates than in the aggressive market rush of the 2005-2006 pre-crisis period, a timeframe that, according to some scholars, propelled the later turmoil due to irregularities surrounding subprime lending, relaxed credit standards and aggressive securitization, among other causes.

The choice of a particular city as focus in real estate research appears to be scarce, while most of the existing analysis takes a nationwide scope or a set of metropolitan areas in the search for trends and generalizations.

As it will be seen in the next section under the description of the unit of analysis, the benefit of focusing on a smaller geographical area is the access to a comparative study that can later lead to aggregation. Similar analyses for those cities that were expected to have been targeted by the all-cash investors could lead to groupings and categorization that would form the ground for an aggregation based on empirical data rather on

[16] In the United States, the 10-year Treasury yield is used as benchmark because, although most loans have a 30-year term, most of the residential mortgages are prepaid within a 10-year term, including refinances under the loan prepayment category. In addition, in the peak of the securitization era, the competing alternative to the MBS as an investment product was the 10-year Treasury bill, for which both prices were related and benchmarked against each other.

[17] Mayer (2011) presents most of these analyses in an exhaustive and yet straightforward manner.

theoretical approaches. Premises then used in forecasting models would be based on results founded on data analysis, with fine tuning obtained as data-breath increases.

This is preferred because, despite the bias inherent in empirical models, theoretical applications are sought to incur in many givens and assumptions that are the tenets of a model and that could be proven to be contrary to expectations.

Additionally, by beginning with wider spatial demarcations, such as the nation, state or even sections within the latter, the demographics at the particular market are overridden. For this reason, most of the studies about wealth and income focus on smaller areas of analysis and, due to the fact that real estate is part of an agent's wealth decisions, it would seem appropriate to match the unit of analysis to that used in such research work and to capture the factors intervening in an individual's daily decisions.

3) Research Methodology

Following, the research questions and hypotheses are stated and explained, after which the unit of analysis and units of observation are described. For the reader solely interested in the empirical outcomes, the present methodological section may be avoided altogether, while attention may be directed to the model results presented under section 6.

Research Questions

Based on the scenario depicted in the introduction and on the value proposition that this analysis may provide as per the literature review, the following research questions will be answered in the current work[18]:

- **i)** What is the relationship between cash purchases of real estate and the prices of condominiums and housing in each of its price tiers?
- **ii)** What is the impact that mortgage interest rate levels have in the prices of condominiums and housing?
- **iii)** What other drivers, such as the technological activity, influence the price of these assets?[19]
- **iv)** How can recessionary periods explain changes in the prices of condominiums and housing in the city?

[18] All questions refer to the city of San Francisco in the state of California.

[19] The choice of drivers is based on availability of data and on significance in the topic as per the literature consulted and the advice of real estate experts.

Hypotheses

In order to answer the previous research questions, the following working hypotheses are established about the real estate market in the city of San Francisco, the transactions taking place and the interactions among market players. These hypotheses are designed from incursions in the prevalent economic literature as described previously and from consultation with real estate experts in the geographical area that constitutes the unit of analysis.

1) ***The real estate market in the city of San Francisco, California, presents the structure of a competitive market.***

The real estate market in the city presents the following characteristics:

a. The purchase and sale of properties is atomized and no single buyer or seller can exert enough influence on the price[20].

b. There are no entry barriers to the market, given that any participant may access readily available information and execute transactions even in the absence of legal presence in the country[21]. In addition, both buyers and sellers have the right to select the real estate agent of their preference and whose services are free of charge to the buyer[22], at the same time that they can execute their own selling or purchasing transactions by themselves if they wish to[23].

c. Access to asset information is unrestricted and freely available in a centralized database under the well-known Multiple Listing Service (MLS). Buyers, sellers and agents have access to a myriad of mobile applications and online databases, the vast majority of which are free of charge[24]. Results obtained from search engines make the acquisition of property data costless and efficient.

In addition, should each of the parties to the transaction engage their own real estate agent, the latter can obtain a substantial volume of data about a given property, including construction permits and the

[20] Commercial real estate and construction lots, including those for high rise, are out of scope from the present analysis.

[21] As a matter of fact, the all-cash sales speculation is partially founded on investors whose residence is not fixed in American territory.

[22] A 6% commission is deducted from the proceeds cashed by the seller, representing both agents' commissions.

[23] Although this election is infrequent, the author has personally met buyers who have successfully carried their own real estate transactions.

[24] In most cases, property information is free or requires the creation of a user, which is also free of charge. These same companies even offer basic market reports, while more elaborate analyses require a modest charge. However, these are not compelling to make a real estate decision, as it can be confirmed by the low number of reports that are actually purchased.

reason for their approval and work, past sales prices and dates of transactions, evictions, and much more. Further, for properties that are in the market, dates and times for open houses are accessible on the internet, while the seller's agent contact information is made public through specialized websites that most of the time do not require a log in or that are free of charge.

d. Properties are homogeneous within the same stratum, for which the market price functions as a signal of asset characteristics and quality. In this sense, apartments differ from houses and price depends on features such as location, number of rooms, latest construction updates and others. Consequently, two condominiums with similar features within the same neighborhood are expected to be sold within a similar price per foot[25]. As a corollary, properties are comparable and can be grouped in stratums of similar characteristics.

It is worth noting that the competitive market assumption made herewith differs from certain of the literature that depicts real estate markets in which the role of the appraiser is crucial in determining the value of the unknowns (Quan and Quigley, 1991). Although this may be the case for some of the geographical markets, it is not applicable to the city of San Francisco for several reasons. Even if the buyer or seller makes transactions in an infrequent manner, the real estate agent fills in the gap with his or her knowledge about the potential property value and the state of the market. Further, currently available databases that are free of charge, including mobile applications, make available several reporting aids for buyers and sellers to get acquainted with current market conditions and to enable them to negotiate. Some of these analytics include free access to historical trends and even addresses to other properties of comparable characteristics recently sold in the neighborhood, all of which are mapped. Lastly, real estate agents volunteer often several trends and analyses that can be found on blogs, internet website, newspapers articles, mailed cards and alike. This results in a real estate market where there is no lack of information, even conflicting or challenging, to make a buying or purchasing decision.

[25] The same cannot be said about the asking price, which carries the intrinsic strategy by the seller's agent. Some sellers post an asking price significantly lower than their expectations to attract a larger number of potential visitors into the open house and a subsequent higher number of offers, creating peer pressure among buyers as mentioned previously.

2) ***In a transaction involving real estate, and at similar price offerings, the seller will prefer cash as a form of payment to credit.***

Following the description of the cash-sales belief as stated in the section dedicated to the introduction, the prevalence of cash over credit is founded on the system of contingencies present in real estate transactions[26].

The sale of a property is executed, among other clauses, by the cancellation of contingencies, which are conditions that the buyer and the seller commit to have accomplished by a term specified in the offer contract. Failure by the buyer to comply with the actions specified under the contingencies clauses could nullify the transaction altogether and forfeit his or her deposit partially or completely.

Generally speaking, the most common and important contingencies are: a) the estimate of the market price as issued by a certified and professional appraiser; b) the approval of the mortgage loan to the buyer by a credit institution; and c) the execution of a formal inspection of the physical property by a competent and certified professional and the subsequent report specifying that the asset is free from major defects.

The completion of all these contingencies takes time, especially the achievement of the credit line by the buyer, a process that after the latest crisis has become more cumbersome and stricter, leading to further delays until the final approval can be obtained[27].

In the meantime, the seller is unable to entertain other offers. This is a waiting period that could also be considered downtime from the standpoint of the transaction. The parties are, during this lapse, involved in executing the paperwork necessary to meet the deadline in a timely manner.

During this waiting time, and besides the cost of money, the seller runs the risk of potential transaction forfeiture. If the mortgage loan is not approved by the financial or credit institution, for instance, the seller will have to return the deposit to the original buyer and begin to search for offers again. In the worst of

[26] The following description is not meant to be exhaustive and only those points necessary for the completion of the present analysis are explained.

[27] A "pre-approval" letter is usually attached to the offer, but the credit is not guaranteed and can only be granted until a full underwriting process has taken place. Recent surveys conducted by The Federal Reserve Board have shown that underwriting has become tighter after the crisis.

cases, if market conditions have declined drastically between the time at which the offer was received and the forfeiture of the transaction, the seller has lost his market timing, creating an opportunity cost[28].

In consequence, the risks and the waiting time added by the credit contingency make a transaction to be paid by a mortgage loan less attractive to a seller than an all-cash offer due to the disadvantages brought by the time, costs and risks involved.

In addition, in many occasions, a buyer paying entirely in cash will surrender the right to carry the appraisal and the property inspection. In the credit case, two formal and certified reports for each instance are to be included and approved by the institution issuing the mortgage line as part of its underwriting procedures, while in an all-cash purchase these inspections are optional to the buyer.

In the past, certain authors have considered these contingencies as price premiums (Allen, Shilling and Sirmans, 1987), but this cannot be the case in the San Francisco market since there is no price differential between an offer carrying contingencies and one that excludes them. As a matter of fact, a monetary compensation for forfeiting these rights would mean a violation of state laws and cannot be implemented, for which the sales price is the benchmark price used in the market[29].

Further, and in defense of the price premium stance, it could be argued that a credit taker would need to bid considerably higher than an all-cash buyer to win the transaction, but this cannot be confirmed by data or monitored beyond suspicion, mostly due to the fact that offers are not recorded in a city database and negotiations between the seller and the offering parties is kept private by the seller and his or her agent, for which the potential impact of an increase in asking price does not result in data available for public inspection.

Moreover, data after the crisis revealed how difficult it is for many buyers to save cash for a down payment on a property, as several analyses about "skin in the game" considered during the mortgage defaults have shown. Since by current underwriting standards the debt-to-loan ratio allowed cannot exceed 80%, the amounts of cash involved in beating an all-cash purchase should be substantial and would assume

[28] There is more work involved, as well, given that status checks and added paperwork are usually required from the buyer.

[29] There is incongruence in presenting price premiums in a competitive market, as well, since the violation of a single buyer's influence on the market price would take place, creating a contradiction to principles.

that a credit seeker would have the bidding power and cash leeway to raise the price considerably. This is, however, incongruent with the lack of competitive advantage by credit seekers as explained so far[30].

Lastly, it is the intent of the current analysis to show whether a cash-only buyer has the power to raise the price substantially. If answered in the positive, a price premium could be sought as the effect of overriding the legal contingencies mentioned. As it will be seen in section 6, results cannot confirm that purchases in cash explain changes in real estate prices, for which the premium position is finally rejected.

In conclusion, the competitive advantage described above and enjoyed by all-cash buyers is chosen over the price premium scheme. Summarizing the discussion this far, a credit applicant will lead to waiting times and risk of transaction cancellation at no cost to him or her[31], but representing potential losses to the seller. Under this scenario, a seller has incentives to accept the offer from a cash-buyer rather than from a credit taker, all other things being equal. This is also consistent with the scenario depicted by media, real estate professionals and market players, most of which, if not all, acknowledge this advantage based on experience[32].

3) ***Condominiums and single family homes are heterogeneous products and should be analyzed separately.***

This hypothesis is not strictly necessary for the analysis herewith presented, but adds value by providing information about the intermingling relationships between the types of assets and several economic factors and payment terms. In addition, this hypothesis is a consequence of the first one, in which the competitive market structure was analyzed and described.

Usually, the clientele for each type of asset differs. A single individual and first time homebuyer may decide to purchase a small or medium sized condominium based on the low maintenance costs and the lower initial investment, while couples or families may decide to purchase a bigger apartment unit or

[30] An alternative position could state that the price premium could be embedded in the offering price by the all-cash buyers by means of a discount, but this is also a contradiction to the bidding beyond asking method as offered by these buyers and which has been described so far.

[31] The buyer also runs the risks of market downturn while these processes are taking place, which could leave him or her without purchasing alternatives after cancellation. In addition, the emotional distress involved in purchasing a home and the expectations of acquiring it put a heavy burden in a person's will to try purchasing several times and in their relationships with the surrounding individuals in most cases.

[32] We begin with this hypothesis as part of the research methodology, to later work with empirical data, which will confirm or falsify the former.

ultimately a house, which allows for further support in the periodic financial liabilities as the earnings of two individuals contribute towards the payoff.

In conclusion, the features presented by the competitive real estate market in San Francisco can be depicted by the following theoretical formula prior to the resolution of the econometric model, which will be treated in section 5:

$$P_{x,t} = f(F_x, N_x, T_x)$$

where $P_{x,t}$ is the price of the real estate asset x in the period t, F_x represents the particular features held by the property x at the time of analysis (such as the year of construction, the number of bedrooms and square footage, among other characteristics), N_x is the neighborhood where the property is located and T_x is the type of asset, that is, condominium or house. This equation portrays the components that make up the pricing of a property in the city of San Francisco, California.

The above formula is meant to be a theoretical representation of the discussions entertained this far. In the section dedicated to the econometric model, the variables representing the scenario depicted by market players, media, real estate professionals and prospective buyers will be presented and the model explained to obtain the results sought as per the research questions stated above.

Unit of Analysis

The level of aggregation selected is spatial and represented by the city of San Francisco in the state of California. All of the observation units, which will be detailed in the following subsection, will be examined under this unit of analysis.

The approach applied herewith favors smaller levels of aggregation for various objectives, but mainly to serve as material for a future comparative analysis. A sufficient number of studies obtained at the city level could serve to further regional or nationwide research dedicated to identify common trends or behavior that can later be used in economic policy analysis. Comparison and aggregation could also aim at the detection of factors and assumptions to be applied in models dedicated to forecasting economic activity.

Further, the selection of the city as a unit of analysis is in agreement with the methodology suggested by the Census Bureau for the study of housing markets, by which metropolitan areas are considered as reasonable approximations, while the use of "smaller unit of analysis-also presents choices" (Iceland and Steinmetz,

2003:1). In the case of San Francisco, the city is chosen as opposed to the metropolitan area, which includes other cities, due to the theoretical differential in demographics within the same metropolis, providing a more precise and secure approach as the level of aggregation narrows.

A final driver in the decision in regards to the unit of analysis is based on the data on property prices, which is issued at the city level in most cases. Ultimately, further studies could be carried to the extent of a higher dimension of territory or several areas could be aggregated into a major one.

Units of Observation

The units of observation to be analyzed under the unit of analysis, that is, under the city of San Francisco, will be the following:

1) Condominiums
2) Single family residential homes in the high price tier
3) Single family residential homes in the medium price tier
4) Single family residential homes in the low price tier

The variables representing these units will be detailed in the following section, which is dedicated to variables and data sources.

4) Variables and Data Sources

The variables to be included in the model in order to answer the research questions as stated are described in the following table, which includes the variable name and its source.

[INSERT TABLE 1 HERE]

where the frequencies are quarterly.

The following table provides descriptive statistics:

[INSERT TABLE 2 HERE]

As it can be observed from the previous table, maximums and minimums fluctuate widely in series related to property prices. This is in line with the theoretical importance of data breath in constructing empirical models.

Other series with considerable differences between maximum and minimum thresholds are the mortgage rate, which was subject to its lowest level in the history of the country upon the latest crisis as explained previously, and the activity in the technology sector, which is thought to accompany the real economy and should be reflective of downturns in economic activity, including the latest great recession.

Finally, as it can be observed from the table, when a shorter data breath is used, the series representing the high pricing tier evinces an Augmented Dickey-Fuller that falls in the rejection area, meaning that integration up to two levels cannot fully correct the series. As it will be seen in the following section, lack of differentiation would prevent this dependent variable from being run against the explanatory variable representing sales of property in cash, for which a double integration accompanied by the use of autoregressive terms was selected[33].

The next table provides the correlation for all variables:

[INSERT TABLE 3 HERE]

As it can be observed from the previous table, all the property price indexes are highly correlated to each other, a conclusion that appears to be in line with expectations, while the low-tiered pricing is the least correlated against all the other variables in the group, especially to the prices of condominiums and high-tier housing.

None of the endogenous variables in the model is found to be highly correlated to an exogenous one, in this case to property prices, while foreclosures appear to be somewhat correlated to asset prices.

The next subsection presents and explains the correction strategies for each variable inputted in the model.

Variable Correction Strategies

As with any regression model, the series were tested and, when necessary, corrected for the absence of stationarity and the presence of seasonality. In most cases, stationarity was absent, although some of the series did not need correction. In the case of seasonality, some of the datasets were provided after a correction for had been applied to the series.

The following table shows the correction strategies applied to each of the working variables, including differentiation and the inclusion of a dummy variable, autoregressive terms and moving averages.

[INSERT TABLE 4 HERE]

As it can be observed in the previous table, all of the variables needed some type of correction. As it is usually the case, several correction alternatives were available for a single variable, in which case preeminence was given to alternatives with the best adjustment to residuals and to the correction alternatives available for the variables in the same relationship. In the face of several plausible and similar outcomes, integration was favored over a fully autoregressive strategy, especially in cases in which certain of the variables in the same

[33] Although this is not the best of all worlds, this alternative allowed to obtain results from the model as applied to the rest of the property variables. As it will be seen further below, the results captured under this correction were highly similar to the ones under the three remaining independent variables which, being highly correlated to the high tier pricing data, provides a sanity check that the correction was appropriate.

equation had differentiation as its best alternative, for which the same level of integration was targeted in both variables when feasible.

Further, some variables are offered with more than one correction methodology to allow running models for relationships that have mutually exclusive alternatives, such as in the cases of all the housing tiers, as well as sales of property in cash.

In addition, and as mentioned in the previous section, the series related to high-tier pricing housing received a correction alternative that included double integration in order to build a differentiation level consistent with the cash sales variable that acted as exogenous to the model. The results obtained were consistent with those derived from other asset tiers, which were found to be highly correlated to this level of pricing.

5) Econometric Model

The econometric model specification includes the working variables detailed in the previous section and is based on the research questions conveyed in section 3.

The method used by the model is Ordinary Least Squares (OLS). As it is customary, the intercept was first included in all cases and later removed when rejected by model output. The equations for which the independent term was removed are listed in the header under table 5, which is presented in section 6.

i) What is the relationship between cash purchases of real estate and prices of condominiums and housing in each of its price tiers?

$$CONDOINDEX09_t = \beta + CASHSALES_t + \varepsilon_t$$

where β represents the intercept and ε_t the error term.

$$HIGHTIER09_t = \beta + CASHSALES_t + \varepsilon_t$$

$$MIDTIER09_t = \beta + CASHSALES_t + \varepsilon_t$$

$$LOWTIER09_t = \beta + CASHSALES_t + \varepsilon_t$$

ii) What is the impact that mortgage interest rate levels have in the prices of condominiums and housing?

$$CONDOINDEX_t = \beta + MORTRATE_t + \varepsilon_t$$

$$HIGHTIER_t = \beta + MORTRATE_t + \varepsilon_t$$

$$MIDTIER_t = \beta + MORTRATE_t + \varepsilon_t$$

$$LOWTIER_t = \beta + MORTRATE_t + \varepsilon_t$$

iii) What other drivers, such as the technological activity, influence the price of these assets?

In this case, and as mentioned, the relationship was chosen based on availability of data series and on the incursions made by previous literature in regards to real estate bubbles as summarized under section 2.

$$CONDOINDEX_t = \beta + UNEMPL_t + SFTECHPULSE_t + FORECLOSURE_t + \varepsilon_t$$

$$HIGHTIER_t = \beta + UNEMPL_t + SFTECHPULSE_t + FORECLOSURE_t + \varepsilon_t$$

$$MIDTIER_t = \beta + UNEMPL_t + SFTECHPULSE_t + FORECLOSURE_t + \varepsilon_t$$

$$LOWTIER_t = \beta + UNEMPL_t + SFTECHPULSE_t + FORECLOSURE_t + \varepsilon_t$$

iv) How can recessionary periods explain changes in the prices of condominiums and housing in the city?

To test for goodness of fit in the introduction of the dummy variable reflecting recessionary periods, the dichotomic variable was run against each series, as follows:

$$CONDOINDEX_t = \beta + RECESSION_t + \varepsilon_t$$
$$HIGHTIER_t = \beta + RECESSION_t + \varepsilon_t$$
$$MIDTIER_t = \beta + RECESSION_t + \varepsilon_t$$
$$LOWTIER_t = \beta + RECESSION_t + \varepsilon_t$$
$$MORTRATE_t = \beta + RECESSION_t + \varepsilon_t$$
$$SFTECHPULSE_t = \beta + RECESSION_t + \varepsilon_t$$
$$UNEMPL_t = \beta + RECESSION_t + \varepsilon_t$$
$$FORECLOSURE_t = \beta + RECESSION_t + \varepsilon_t$$

The variable representing sales of property in cash was not run against recessionary periods due to the short data breath in the series, which begins only in 2009, representing only one quarter of recession and, therefore, leading to insufficient data points for the model to produce a regression that is not spurious.

The following graph set shows major explanatory variables included in the above equations and is presented for visual inspection purposes. As to the endogenous variables in their different frequencies under graph sets 1 and 2, they were presented in section 1.

[INSERT GRAPH SET 3 HERE]

The next section presents and explains the results obtained from running the model with the previous equations.

6) ***Results***

The results are presented in tabular format and separated by period breath or frequency to ease analysis. Following, each of the results arising from the model is inspected separately to enable potential alternatives for the outcomes and for the intervening factors leading to them.

In table 5, the relationships across quarterly variables run under the model from the entire period beginning 1998 are presented.

[INSERT TABLE 5 HERE]

Table 6 offers the relationships between the quarterly series beginning in 2009.

[INSERT TABLE 6 HERE]

Table 7 presents the significance of recessive periods on each of the variables analyzed.

[INSERT TABLE 7 HERE]

The previous tables are analyzed and their conclusions explained in detail in the following subsections.

Cash Sales and Property Prices

This is the main objective of the present analysis, as the examination of the output obtained from running the model in which the relationship between cash sales of real estate and property prices is depicted will provide evidence as to the cash-only myth described in section 1.

In this sense, and as seen in table 6, sales of condominiums in cash-only forms of payments cannot be said to impact asset prices. This conclusion is based on 22 or 23 observations comprising the period beginning in the year 2009. The resulting coefficient falls in the rejection area, for which it cannot be concluded that there is a significant dependence of the mean of property prices on cash sales.

The same is true for each of the housing tiers. Although a segregation of cash sales by property type and tier could prove to be useful, it can be seen from the results that cash-only sales did not evince a strong influence on any of the property types, which is sufficient to reject the cash-only sales belief.

In conclusion, the claim that cash-only buyers are displacing potential credit seekers in their aim to buy a home is unsubstantiated. The results apply also to the belief that workers in companies in the technological and other sectors, and who have increased their cash holdings by means of their employers' IPO's, can exert sudden and substantial increases in asset prices.

As corollary, the decision held by sellers to prefer non-contingent offers overall cannot be said to have an impact in the property prices in the city, which also declines the price premium position discussed in section 3, for which other explanations should be found for the fast increase in asset prices. This is also a confirmation of the presence of a competitive real estate market in the city, given that no single buyer can exert enough influence on the price.

Mortgage Interest Rate Levels and Real Estate Prices

As it can be observed in table 5, mortgage interest rates are not able to explain fluctuations in the prices of condominiums, as well as in all of the three housing tiers. Therefore, it cannot be concluded that there is a significant dependence of the mean of property prices on the level of mortgage interest rates.

This conclusion does not appear to support the view that the public tends to think in terms of nominal interest rates in their financial decisions due to the "Money Illusion[34]" bias (Shiller, 2007). If such was the case, the lowest interest rate in the history of the country would have shown to be significant in the purchase decisions and the increase of wealth by families and individuals[35].

At this point then it is possible to set forth a general statement as to the relationship between the form of payment and property prices in San Francisco. Cash-only sales and mortgage interest rates do not appear to explain the fluctuation in property prices in all types and tiers of real estate as per the model, based on a data breath beginning 2009 and 1998, respectively. Hence, "bubbly" scenarios of real estate in the city cannot be attributed to the form of payment and other reasons should be found for the sudden changes in property prices.

Further, some of the analysis of real estate bubbles has shown the mortgage interest rate level as an assumption over which models are constructed. The empirical findings in the present analysis appear to contradict the use of mortgage interest rates in forecasting real estate demand and, therefore, price levels, as it cannot be concluded from historical data that there is dependence by property prices on mortgage interest rates.

As a result, other explanatory variables should be sought as opposed to the form of payment.

[34] Although the term was treated by Fisher many decades ago, Shiller's presentation is recommended due to its readability.

[35] It is worth mentioning that this is not conclusive evidence, as other intervening factors could be at play, such as the recent downturn in the real estate market, which depleted a significant number of agents from their sources of incomes. Other reasons could be the more stringent underwriting parameters and the fear that the market could turn down even further before the 2012 rebound.

Unemployment and Real Estate Prices

Due to the relationship between unemployment and interest rate levels in monetary policy, and given that mortgage interest rates are calculated based on the latter as part of the cost of capital to financial institutions, it would be contradictory to find a significant relationship between unemployment and real estate prices given that the mortgage interest rate did not show to be significant.

The relationship was nevertheless inspected for the sake of completeness, while expectations were confirmed, as it may be observed from the model output shown in table 5. As a result, it cannot be concluded that there is a significant dependence of the mean of property prices on unemployment levels.

At the same time, and as it will be seen below in the analysis of recessive periods, contractions to the point of a confirmed and official recession can exert considerable influence on the downward trend of prices in the property sector, suggesting perhaps that levels of employment by themselves cannot be deemed significant, while other indicators of macroeconomic activity in the real economy, such as consumer spending or investment, may be playing an important role in property price declines. As it will be seen further, property price increases are better explained by the technology sector, for whose analysis a nationwide indicator is used.

The Foreclosure Myth

Foreclosures have been claimed to drive prices of real estate upwards at certain times in some cities in the United States. In many cases, these represent stressed sales or transactions of real estate owned by financial institutions.

In interviewing real estate agents and experts, the vast majority agreed that foreclosures cannot be a price driver in the case of the city of San Francisco due to factors such as limited supply of units and geographical range, accompanied by a highly desirable metropolis which, in the view of real estate connoisseurs, can maintain demand high in most times and portrays the city as a “safe market.” Although these last reasons would require further verification, the overall opinion by real estate experts in regards to the analysis of the relationship between foreclosures and real estate prices in the city is confirmed by the results obtained from the analysis of the relationship between the levels of foreclosed properties and the prices of condominiums and each of the housing tiers, as evinced in table 5. In the present case it can then be said that empirical research confirms the common belief.

Could it be the Technology Sector?

In table 5 the activity in the technological sector, which is built as a nationwide index[36], is shown to exert a substantial impact in the fluctuation of prices of condominiums and high-end properties.

In the case of condominiums, for each percentage change in the technology indicator, the average change in the property price indicator is 42.4% with a confidence level of 95%. In the case of high-end tier housing, the average change in real estate prices is 22.7% with a confidence level of 90%. In both cases, the technology sector appears to be able to explain a significant part of the fluctuation of property prices, as it can be observed from the high R squares in each case.

It is worth noting that, in line with the aim of the type of indicator as the San Francisco Tech Pulse, recessionary periods are found to be significant and were included in the model by means of a dichotomic variable.

Conversely, the city does not appear to be impacted by activity in the technology industry nationwide in the prices of medium and low tier housing, for which different explanations should be sought by the use of appropriate data targeted to the specific neighborhoods.

If the results obtained so far are combined, it can be concluded that, although the form of payment is by no means an explanatory variable of changes in property prices in the city, the technology sector is significant in exerting influence on the prices of condominiums and high-tier housing. However, due to the ineffectiveness of cash-only sales to explain property price fluctuations, liquidity from IPO's by technology companies cannot be attributed the role as a major source of price change.

This is an important area of concern in the city, given that after the dot.com boom at the end of the year 2000, a lingering remark by many commentators has been the fictitious creation of wealth by overvalued public offerings of stock and the respective negative impact in what is considered safe or tangible wealth, meaning real estate. This conclusion was driven by sudden and large vacancies of housing and the plummeting of real estate prices along the Silicon Valley as consequences of the technology crash more than 15 years ago.

[36] The use of a variable measuring industrial and consumption activity in the United States does not forsake its application to the city of San Francisco, given that the Silicon Valley represents the largest manufacturing area in technology in the country.

The San Francisco Tech Pulse is constructed with indexes that reflect production of technological goods, such as personal computers and communication equipment, employment in the technology sector, including telecommunications, web search portals and data processing, investment in equipment and software, personal consumption in technological goods and manufacturers' shipments, among others (Antoniades, Hobjin and Stirob, 2003 and Hobjin, 2008). In observing the indicator and the results from the model run, it can be concluded that it is the real economy in the technology sector as opposed to companies' valuations that can exert a significant influence on the real estate market in the city.

This has several consequences, being the most important one that models attempting to forecast recessions based on the real estate market may need further fine tuning when it comes to the variables inputted. Secondly, these models may need to be abandoned altogether in favor of a more certain and representative analysis. In this case, the use of an indicator, such as the San Francisco Tech Pulse, has been suggested as a means of a possible thermometer of economic activity in the country.

Alternatively, a reverse conclusion in regards to forecasting models seems to be in line with the findings. That is, booms and busts in the real estate market may possibly be predicted by the health of the economic activity in the sector that signifies the most substantial structure in the geographical area, in this case, technology, while the opposite is not feasible due to the relationship of dependence of the property market on the real economy.

In other words, real estate may not be deemed the best market to forecast real economic activity and its recessions, given the number of indicators from economic activity that have an important role in the demand of property and, therefore, on the circumstances that may create a type of "bubbly" market. These variables from the real economy, such as personal consumption and employment, which would presumably be the outcome of the forecasting model sought, are the same indicators that currently function as assumptions to forecasting models. However, if the results obtained in the present analysis are valid, the use of the real estate market as a thermometer to measure recessionary periods and real activity would defeat its purpose.

Significance of Recessionary Periods

As it can be observed in table 7, periods of recession were found to be impactful in most of the working variables, with the exemption of low-tier housing and foreclosure volume. These results are in line with the analysis of the technology sector in the real estate market.

Output confirms once again the lack of preeminence of foreclosures in the real estate market in the city, while the conclusion on low-tier housing may lead to consider the possible presence of features that are particular to certain neighborhoods in the city. Alternatively, low-tier housing could have characteristics that would disqualify it from the classification of a competitive market. In summary, this area deserves further research and empirical incursions, while data is still scarce to afford a more genuine assessment.

7) Conclusions

The results obtained in the present analysis contradict the common belief that cash-only sales are drivers of real estate prices in San Francisco. Further, the form of payment was found to be innocuous in the fluctuation of property prices.

The myth that wealthy foreign investors or employees with sudden liquidity obtained from their employers' IPO's are crowding-out credit seekers in the search for their home can no longer be held as a valid reason for the trend upwards in property prices that began in 2012 at the wake of the recovery after the last great recession.

Other variables, such as the mortgage interest rate, unemployment and foreclosure levels have been found to be ineffective in explaining price changes in the property market in the city. In addition, "money illusion" cannot be fully supported while levels of nominal interest rates have been at their all-time low.

An important and substantial reason for changes in the prices of condominiums and high-end housing has been found in the real activity in the technology sector, including in the investment, manufacturing, consumption and shipments of technology and technology related activities. The technology sector, however, cannot explain variations in pricing in medium and low-tier housing, for which other reasons should be sought in such cases and in the presence of additional data.

Finally, recessive periods were found to be material in driving property prices of all types. This links real estate in San Francisco not to foreign wealthy investors or IPO's as a direct cause, but to the real economy,

which could show that the city is a sufficient functional economic area in its own right when it comes to real estate, while sudden and material inflows of cash may not be crucial in creating “bubbly” scenarios.

At last, the myth has been lifted.

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APPENDIX I: TABLES

TABLE 1: DESCRIPTION OF VARIABLES AND THEIR SOURCES

(1) Series obtained from CONDOINDEX (from 1998), of shorter period as CONDOINDEX09.
(2) Series obtained from HIGHTIER (from 1998), of shorter period as HIGHTIER09.
(3) Series obtained from MIDTIER (from 1998), of shorter period as MIDTIER09.
(4) Series obtained from LOWTIER (from 1998), of shorter period as LOWTIER09.

VARIABLE	DESCRIPTION	SOURCE
CONDOINDEX	Condo Price Index for San Francisco, California	S&P Dow Jones Indices LLC
CONDINDEX09	Condo Price Index for San Francisco, California (1)	S&P Dow Jones Indices LLC
HIGHTIER	Home Price Index (High Tier) for San Francisco, California	S&P Dow Jones Indices LLC
HIGHTIER09	Home Price Index (High Tier) for San Francisco, California (2)	S&P Dow Jones Indices LLC
MIDTIER	Home Price Index (Medium Tier) for San Francisco, California	S&P Dow Jones Indices LLC
MIDTIER09	Home Price Index (Medium Tier) for San Francisco, California (3)	S&P Dow Jones Indices LLC
LOWTIER	Home Price Index (Low Tier) for San Francisco, California	S&P Dow Jones Indices LLC
LOWTIER09	Home Price Index (Low Tier) for San Francisco, California (4)	S&P Dow Jones Indices LLC
MORTRATE	30-Year Conventional Mortgage Rate	Freddie Mac
SFTECHPULSE	Coincidence Index of Activity in the U.S. Information Technology Sector	Federal Reserve Bank of San Francisco
UNEMPL	Unemployment Rate in San Francisco County/City, California	U.S. Bureau of Labor Statistics
FORECLOSURE	Rate of Properties Sold in Foreclosure	Zillow Group
RECESSION	Recession Indicators for the United States from the Period following the Peak through the Trough	NBER
CASHSALES	Percentage of Properties Sold in Cash and without Borrowing	Zillow Group

TABLE 2: DESCRIPTIVE STATISTICS

Excludes series RECESSION (dichotomic variable)

	STATISTICS					NORMALITY				OBS	AUGMENTED DICKEY-FULLER		
	MEAN	MEDIAN	MAX	MIN	STD DEV	SKEWNESS	KURTOSIS	JARQUE-BERA	PROB		PROB	LAGS	MAX LAGS
CONDOINDEX	153.548	144.750	229.760	72.790	39.413	-0.076	2.308	1.482	0.476	71	0.0000	0	11
CONDINDEX09	161.354	145.295	224.240	129.500	30.200	0.767	2.083	3.197	0.200	24	0.0067	0	5
HIGHTIER	149.693	145.400	214.020	78.430	33.678	-0.216	2.468	1.388	0.499	71	0.0000	1	11
HIGHTIER09	160.053	147.665	298.120	137.240	22.707	0.880	2.205	3.730	0.155	24	0.1880	5	5
MIDTIER	155.386	145.440	222.540	77.520	40.378	0.055	2.142	2.209	0.331	71	0.0000	0	11
MIDTIER09	155.326	144.240	206.840	129.100	25.792	0.728	1.963	3.195	0.202	24	0.0603	3	5
LOWTIER	160.040	142.320	275.490	74.820	57.457	0.580	2.251	5.644	0.059	71	0.0000	0	11
LOWTIER09	138.530	120.520	204.400	106.380	33.767	0.847	2.078	3.717	0.156	24	0.0551	3	5
MORTRATE	5.665	5.840	8.320	3.320	1.310	-0.025	2.076	2.531	0.282	71	0.0000	0	11
SFTECHPULSE	80.057	76.884	117.405	63.891	11.718	1.380	4.938	33.675	0.000	71	0.0110	1	11
UNEMPL	5.540	5.400	9.300	2.700	1.816	0.496	2.148	5.063	0.079	71	0.0000	4	11
FORECLOSURE	0.363	0.339	0.958	0.059	0.199	0.996	3.633	12.927	0.001	71	0.0002	4	11
CASHSALES	28.862	30.300	35.600	21.000	4.245	-0.529	2.230	1.713	0.424	24	0.0000	2	5

TABLE 3: CORRELATION ACROSS VARIABLES

Excludes series RECESSION (dichotomic variable)

	HIGHTIER	MIDTIER	LOWTIER	CONDOINDEX	FORECLOSURE	MORTRATE	SFTECHPULSE	UNEMPL
HIGHTIER	1.000	0.945	0.793	0.993	-0.655	-0.054	-0.114	-0.036
MIDTIER	0.945	1.000	0.944	0.957	-0.696	-0.344	-0.109	-0.123
LOWTIER	0.793	0.944	1.000	0.825	-0.642	-0.076	-0.039	-0.262
CONDOINDEX	0.993	0.957	0.825	1.000	-0.649	-0.477	-0.086	-0.103
FORECLOSURE	-0.655	-0.696	-0.642	-0.649	1.000	0.216	0.201	-0.324
MORTRATE	-0.054	-0.344	-0.076	-0.477	0.216	1.000	0.556	-0.471
SFTECHPULSE	-0.114	-0.109	-0.039	-0.086	0.201	0.556	1.000	-0.685
UNEMPL	-0.036	-0.123	-0.262	-0.103	-0.324	-0.471	-0.685	1.000

TABLE 4: CORRECTION STRATEGIES FOR STATIONARITY AND SEASONALITY

(*) Alternative correction employed in cases in which model residuals evinced weaker correlation.
(**) Non-differentiated version to meet the lack of integration in other variables in the model.
(***) Correction with double differentiation to meet the integration level in other variables in the model.

VARIABLE	DIFFERENTIATION		RECESSION	AUTOREGRESSION				MOVING AVERAGE			
	1	2		1	2	3	SAR(4)	1	2	3	SMA(4)
CONDOINDEX	**X**			**X**							
CONDOINDEX **(*)**	**X**		**X**	**X**							
CONDINDEX09	**X**			**X**							
HIGHTIER	**X**			**X**					**X**		
HIGHTIER09		**X**				**X**					
HIGHTIER09 **(**)**				**X**			**X**	**X**			
MIDTIER	**X**		**X**	**X**							
MIDTIER09	**X**			**X**							
MIDTIER09 **(**)**				**X**	**X**						
LOWTIER	**X**			**X**	**X**						
LOWTIER09	**X**			**X**							
LOWTIER09 **(**)**				**X**	**X**						
MORTRATE	**X**										
SFTECHPULSE	**X**							**X**	**X**		**X**
SFTECHPULSE **(*)**	**X**		**X**	**X**							
UNEMPL	**X**			**X**			**X**				**X**
UNEMPL **(*)**			**X**								**X**
FORECLOSURE	**X**					**X**					
CASHSALES	**X**			**X**							
CASHSALES **(**)**					**X**		**X**	**X**			
CASHSALES **(***)**		**X**					**X**				

TABLE 5: REGRESSION OF QUARTERLY SERIES FROM 1998

METHOD: Ordinary Least Squares
Coefficients presented first, then standard errors in brackets and R square in bold.
Intercept was eliminated due to rejection in the following pairs: HIGHTIER (MORTRATE); MIDTIER (MORTRATE; SFTECHPULSE; UNEMPL; FORECLOSURE); LOWTIER(MORTRATE; SFTECHPULSE; UNEMPL; FORECLOSURE)
** The null hypothesis that the coefficient is zero can be rejected with a confidence level of 95%
*** Confidence level of 90%
N/a The model violates one or more of the regression principles (residual correlation, heteroscedasticity) or rejects the dichotomic variable

	CONDOINDEX		HIGHTIER		MIDTIER		LOWTIER	
	Includes RECESSION	Excludes RECESSION	Includes RECESSION	Excludes RECESSION	Includes RECESSION	Excludes RECESSION	Includes RECESSION	Excludes RECESSION
MORTRATE	1.012	N/a	N/a	0.726	0.551	N/a	N/a	1.158
	(1.817)	N/a	N/a	(0.992)	(1.218)	N/a	N/a	(1.250)
	0.412	N/a	N/a	**0.557**	**0.751**	N/a	N/a	**0.845**
UNEMPL	-0.259	N/a	-0.336	N/a	-0.322	N/a	N/a	-0.152
	(0.236)	N/a	(0.528)	N/a	(0.622)	N/a	N/a	(0.267)
	0.703	N/a	**0.636**	N/a	**0.748**	N/a	N/a	**0.855**
SFTECHPULSE	0.424 **	N/a	0.227 ***	N/a	0.136	N/a	N/a	-0.026
	(0.175) **	N/a	(0.135) ***	N/a	(0.179)	N/a	N/a	(0.212)
	0.718 **	N/a	**0.647** ***	N/a	**0.750**	N/a	N/a	**0.846**
FORECLOSURE	0.837	N/a	-0.563	N/a	-0.754	N/a	N/a	0.670
	(2.350)	N/a	(3.419)	N/a	(2.899)	N/a	N/a	(3.663)
	0.654	N/a	**0.634**	N/a	**0.747**	N/a	N/a	**0.843**
Observations	*70*	*70*	*70*	*70*	*70*	*70*	*70*	*70*

TABLE 6: REGRESSION OF QUARTERLY SERIES FROM 2009

METHOD: Ordinary Least Squares
Coefficients presented first, then standard errors in brackets and R square in bold.
Intercept eliminated in all cases due to rejection by the model

	CONDOINDEX09	HIGHTIER09	MIDTIER09	LOWTIER09
CASHSALES	0.026	0.055	0.131	0.132
	(0.184)	(0.127)	(0.141)	(0.166)
	0.550	**-0.173**	**0.664**	**0.523**
Observations	*23*	*22*	*23*	*23*

TABLE 7: SIGNIFICANCE OF RECESSIVE PERIODS IN ASSET PRICES FROM 1998

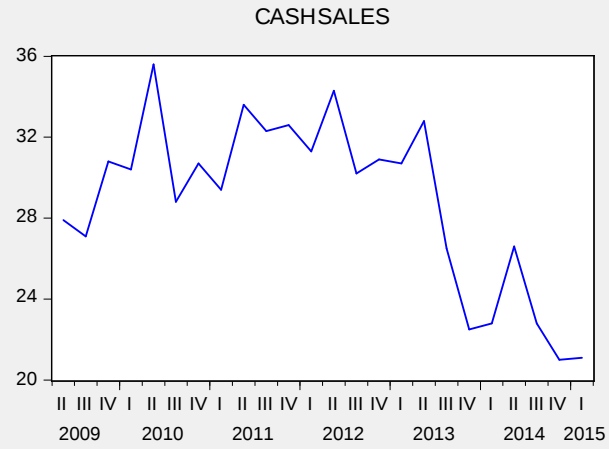
METHOD: Ordinary Least Squares
Coefficients presented first, then standard errors in brackets and R square in bold.
* The null hypothesis that the coefficient is zero can be rejected with a confidence level of 99%
** Confidence level of 95%
*** Confidence level of 90%

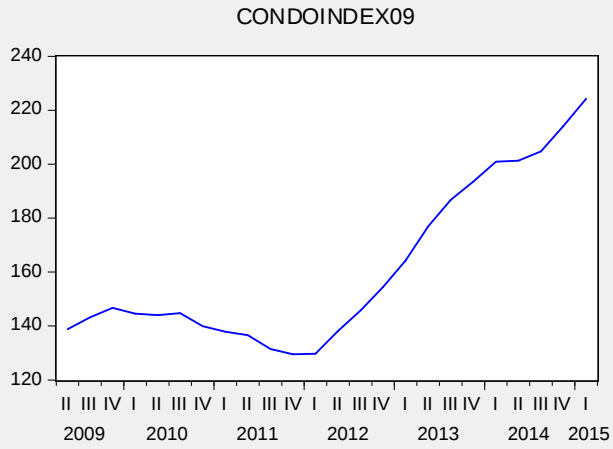
	CONDOINDEX	HIGHTIER	MIDTIER	LOWTIER	MORTRATE	SFTECHPULSE	UNEMPL	FORECLOSURE
	-7.587 *	-7.917 *	-6.827 **	-2.075	-0.163 ***	-4.306 *	0.750 *	0.022
RECESSION	(1.325) *	(1.157) *	(1.745) **	(2.296)	(0.098) ***	(0.946) *	(0.131) *	(0.048)
	0.674 *	**0.655 ***	**0.757 ****	**0.845**	**0.016 *****	**0.659 ***	**0.460 ***	**0.133**
Observations	*70*	*70*	*70*	*70*	*70*	*70*	*70*	*70*

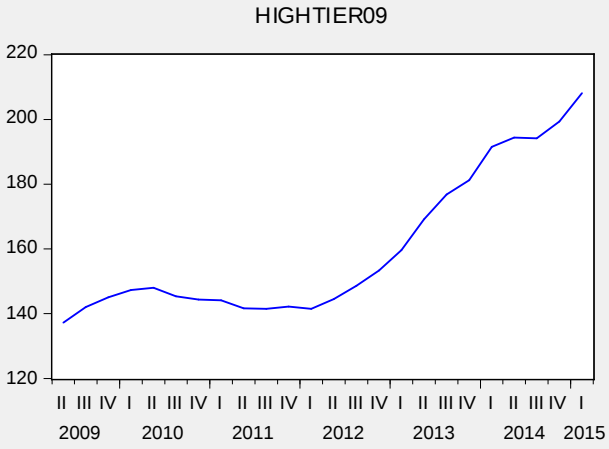
APPENDIX II: GRAPH SETS

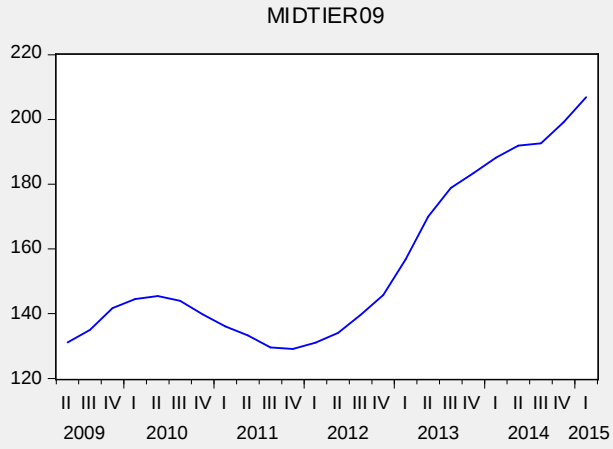
GRAPH SET 1: REAL ESTATE PRICES IN SAN FRANCISCO, ALL ASSET TYPES, QUARTERLY FREQUENCIES (from 1998)

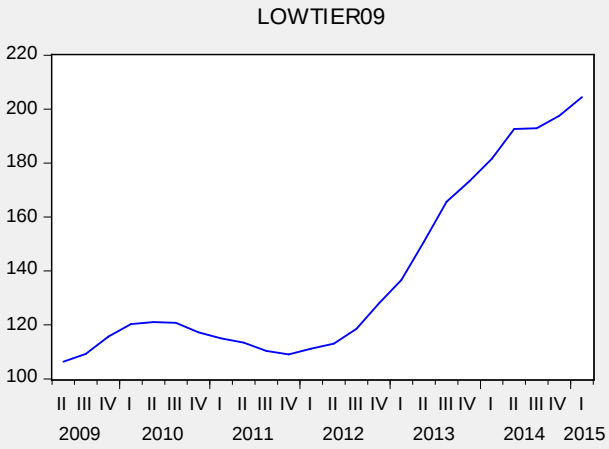
GRAPH SET 2: PROPERTY PRICES, CONDOMINIUMS AND ALL TIERS, AND CASY SALES, QUARTERLY FREQUENCY (FROM 2009)











GRAPH SET 3: EXPLANATORY VARIABLES, QUARTERLY FREQUENCY (from 1998)