HOUSING MARKET ANALYSIS

Supply and Demand

Pacey Economics, Inc.
January 6, 2015
EXECUTIVE SUMMARY

Concerns over the lack of condominium construction in the Denver area have led some to allege fault in the existing construction defect laws, and to argue that further limiting a homeowners’ avenue for remedies will reduce costs to builders, who will then choose to construct more condominiums in the Denver area urban centers. However, a careful analysis reveals that the reasons for the lack of condominium construction are the current low demand for such housing and stricter financing qualifications for builders and owners, both of which are primarily consequences of the recent recession and the credit market scandal and upheaval, and not construction defect costs. As will be demonstrated in this report, the lack of demand resulted in low condominium sales prices, making apartment construction more profitable in the Denver urban centers.

The market value of apartments relative to detached homes has grown steadily since 2006, creating a clear market incentive to build apartments. Further, our observations on historical condominium prices from various data sources (i.e., housing market data websites) indicate the growth in apartment values relative to condominium values has been even greater than to detached housing. (We are seeking permission to reprint this information.)

These market conditions are not unique to Denver, but have been a nationwide phenomenon in cities where rapid apartment building and rising rents have become the norm over the past several years.

The following chart shows there was a surplus of condominiums constructed in 2009 (reflected in the increase in the number of unsold units). In response to the slow sale of condominiums during that period is the supply response of reduced construction, reflected locally in the dramatically reduced number of permits (which may or may not result in actual buildings) issued for condominium construction in the Denver area between 2006 and 2013. The chart also shows that condominium building activity in Denver parallels that of the Western region of the U.S. Also, (although not shown on the chart) the behavior of condominium completions for the U.S. is nearly
identical to that of the Western region trend (just larger volume). Of note, the shift between the Denver permits and Western completions likely reflects the time it takes, from one to two years, for a building to be completed after a permit is issued.

![Condominium Completions & Sales](image)

Condominium Completions & Sales

Sources: U.S. Census Bureau (Western Region includes CO, NM, WY, MT, AZ, UT, ID, WA, OR, NV, CA and AK); Denver Metro Area Housing Diversity Study

It is an economic reality that the 2008 financial crisis and the residual effects from the Great Recession resulted in low demand for many goods and services, including housing products.

Stringent lending requirements, typically manifested in higher down payments and higher credit scores, plus increased origination fees and mortgage insurance premiums that were put in place following the housing bubble served to correct some of the lending issues BUT also led to increased difficulty in qualifying for home ownership (i.e., reduced demand). The charts below illustrate the negative impact of the lending requirements on changes on housing ownership.

Higher Down Payments

*If a buyer could have purchased a $200,000 home with a 3% down payment, but now must put 10% down, this will result in additional closing costs of $14,000.*
**Initial fees and charges for conventional loans have increased from 0.45% in 2005 to 1.30% (nearly three-fold) in 2014. Although seemingly small on a $200,000 mortgage, this increase will amount to an additional $1,700 up-front charge to the homebuyer.**

![Graph of Initial Fees and Charges on Conventional 30 Year Fixed Rate Non-Jumbo Single Family Loans](image)

**Source:** Federal Housing Finance Agency

**Mortgage Insurance Premiums for FHA Loans with Terms Greater than 15 Years**

<table>
<thead>
<tr>
<th>Year</th>
<th>Premium Rate</th>
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<tr>
<td>2008</td>
<td>0.50%</td>
</tr>
<tr>
<td>2013</td>
<td>1.30%</td>
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![Graph of Mortgage Insurance Premiums for FHA Loans](image)

**Source:** U.S. Department of Housing and Urban Development; Rates represent the minimum.

**Annual premiums for FHA loans increased from a low of 0.50% circa 2008 to current annual rates of 1.30% (more than double). Also, the time required to pay the mortgage insurance premium was dramatically increased resulting in further long term costs to the buyer. Because many FHA loans are for buyers who cannot afford a large down payment, these costs substantially increase the cost of owning a home. In our example, a .80% increase on a $200,000 purchase will add another $1,600 annually.**

![Graph of Average Weighted Credit Scores for Freddie Mac 30-Year Fixed Rate Loans](image)

**Source:** Freddie Mac

**Further, mortgage companies Freddie Mac and Fannie Mae now require higher credit scores to be eligible for a conventional loan. (The same is true for FHA loans which are typically more applicable to first-time homebuyers). The higher credit score requirements remove a subset of the population that would otherwise be willing to buy a home.**
In addition to the more stringent lending requirements, depressed wages and high unemployment over the past several years, consequences of the 2008 recession, made homeownership of any kind less affordable across all ages, and to first-time homebuyers in particular.

**Current Real Income as a Percent of Real Income from Approximately a Decade Ago**

Every age group has experienced some loss of purchasing power, but the greatest reduction is for the younger generation (generally first-time homebuyers) whose real income is only 82.7% of what they earned approximately a decade ago. These lower real incomes result in a downward “shift” in the demand for housing, as well as other goods and services.

**Unemployment Rates for the Denver Metropolitan Area**

In addition to falling real income, the recession resulted in high unemployment rates in the Denver metropolitan area (as well as nationally).


Source: Bureau of Labor Statistics
Further aggravating these factors are the natural demographic changes that are taking place in our society. The Millennials are coming to the age where home buying traditionally begins to take place. However, due to a myriad of factors including increased student debt, decreased marriage rates and postponed child bearing, younger generations are delaying forming households of their own, further dampening the demand for homeownership.

**Average Debt of Colorado Four-Year Graduates**

The average debt of Colorado four-year college graduates increased from approximately $15,000 in 2004 ($18,200 in 2012 dollars) to nearly $25,000 in 2012 (the most recent year of available data), over a one-third increase in real dollars. Such debt decreases the demand for housing, given the debt-to-income requirements of lenders, as well as the common sense of consumers.
Marriage is highly correlated to homeownership and married individuals ages 26 to 30 are more than twice as likely to purchase a home as those who have not married.

However, the percentage of those aged 26 to 30 and married has fallen in Colorado from approximately 75% in the 2000s to 50% today. The reduced number of young, married individuals is yet another reason for the decrease in the demand for home ownership in the Denver metro area.

Also, the percent of 26-30 year olds living at home has increased by some 30% in the last decade in Colorado, consistent with the trends in national data.
It is another economic reality that when construction costs rise, supply will decrease. Labor costs, materials costs, and construction insurance premiums (as well as the costs of remedy or the costs of potential lawsuits), all affect the costs of building and ultimately, the profitability to the builder.

**Annual Payroll per Employee in the Construction Industry**

The average pay of an employee in the construction industry steadily increased from 2005 to 2012. Construction labor costs for the Denver Metro area have been substantially more (15 to 20%) than the national average for this class of worker, increasing Denver area builders’ overall costs relative to the national market.

*Source: County Business Patterns, US Census*

**Producer Price Index of New Construction**

The Producer Price Index is a more general measure of new construction costs. This index includes all of the costs of building (e.g., labor, materials) weighted by their respective usage. The Producer Price Index shows that the costs of new construction increased by more than 20% from 2006 to 2013, putting downward pressure on the overall supply of housing.

*Source: Bureau of Labor Statistics*

The data illustrated in the previous charts show that costs have increased for builders in recent years, which will negatively impact both the supply of housing products as well as the profits to developers and builders.
Construction insurance premiums and costs of construction defects and/or associated litigation are factors that impact the supply of housing, with increased (decreased) costs having a negative (positive) impact on the supply of housing.

However, we were unable to obtain relevant empirical data to ascertain the trend of insurance premium costs (and associated coverage) or litigation costs.

These data exist but are only available from the developers/builders who claim the current construction defect laws make building condominiums exorbitantly expensive (apparently because litigation or the threat of litigation).

While this data could be voluntarily produced by the industry or gathered through legislative action, neither has occurred to date.

Importantly, a careful analysis (the details of which are provided in the body of this study) of construction defect statutes across the nation shows that Colorado laws are quite similar to (and less onerous to the Colorado developer/builders) than those in many other states. In addition, we observe that:

- If, in fact, lawsuits or the threat of lawsuits or high insurance rates are the reason for reduced condominium construction, then the proper solution is to preemptively prevent construction defects from occurring.
- Preventing construction defects can be accomplished with quality control processes that have been developed over the last several decades and utilized by apartment owners and other industries that require quality assurance to their customers. Providing quality control is a normal cost of business.
- The solution to construction defect issues is not to make it easier to allow poor workmanship or construction defects and then shift the subsequent costs to unsuspecting consumers.

The earlier report by Environmental Planning Systems (EPS) found the Colorado construction defect statute(s) are likely to increase the cost of a condominium construction per $15,000 per unit and such a cost increase would deter the construction of condominiums in Denver urban centers. We found NO empirical evidence to support such a claim and we must STRONGLY DISAGREE.

Even if one is willing, for the sake of the argument, to assume a $15,000 per condominium unit cost increase (remember we do not believe this can be supported) due to increased construction insurance premiums because of potential construction defect litigation, the EPS claim cannot be supported for reasons outlined below:
Consider a potential homeowner who is willing and able to purchase a $200,000 condominium unit but, because of the increased costs (from increased insurance premiums due to construction defect litigation), the price is now $215,000 (i.e., the full cost is passed on to the home buyer).

- This new homeowner will have to amortize the $15,000 into a 30 year mortgage which will amount to approximately $750 more in annual payments for the homeowner. EPS seems to claim this will deter all construction by builders of condominiums.

- Now consider this new homeowner faces a 10% down payment rather than a 3.0% down payment, requiring $21,500 cash upfront rather than $6,450 or $15,050 more cash needed for a down payment. This is a more dramatic barrier to purchase than the additional $750 per year if the full cost of the builder’s insurance premium is passed on to the new homeowner.

- Now further consider, as noted above, that there is also an increase in the origination fee which increased approximately 75 basis points in recent years (since 2007/2008) adding $1,600 more in upfront costs and a mortgage insurance premium with an 80 basis point increase over the same time frame adding an additional $1,720 in annual costs to the homeowner. Both are clearly more limiting for a potential homeowner than the amortized annual cost of the fully passed on cost of the claimed cost of construction defect litigation.

- Finally, consider the earnings of likely first time buyers (26-30 year olds) today is only 83% of the earnings (real) of their counterparts a decade ago BUT housing prices have increased, obviously making home ownership even more difficult.

Clearly, the increased down payment, origination fees, mortgage insurance premiums, reduced real earnings are all more significant financial deterrents to home ownership than any barrier from construction defect laws.
The good news for the housing market is that economic activity is finally on the upswing in Colorado and across the nation, allowing demand to rekindle and market forces to provide both the demand and supply incentives necessary to induce condominium construction.

- Also good news, markets are continuing to correct, unemployment rates are reaching more normal levels, the economy is sustaining its recovery, and incomes are starting to rise.
- Further good news, banks are beginning to loosen their lending requirements and interest rates still remain at low levels allowing the market to feed an increase in the demand for housing products.
- Also, if the Millennials’ delay in home buying is “pent-up” demand, there will be a natural increase in the demand for housing products once they begin to marry and have children.

Ultimately, when the price is right, which is determined by demand and supply in a market economy, developers/homebuilders will focus on constructing condominiums again. (Moreover, if there really was an unmet demand for condominiums, apartments can be converted to condominiums.)

- The demand for condominiums appears to be gaining momentum as prices of condominiums are on the rise, which will result in more condominiums being built as a part of the normal market process.
- In fact, there are a half-dozen or more condominium projects either currently being developed or in the planning and processing stages.

Limiting or restricting a homeowner’s avenue to remedy a construction problem by changing the Colorado construction defect statute will not make the costs of repair go away.

- Modifying the statutes will only shift the remedy costs to the individual homeowner and/or future homeowner (via increased cost and/or reduced property value), who had no way of knowing of this defect prior to purchase of the housing unit.
- In addition to shifting costs to the individual homeowner, the property value of the entire complex will be reduced if the other owners have similar issues.
- There is a further negative ripple effect from an individual homeowner to a complex or neighborhood of homeowners to the overall community as property values fall, lowering property tax values, and ultimately lowering city revenues and services.
The Colorado construction defect statute serves two public policy purposes:

- It assures homeowners or potential homeowners that there is an avenue to seek remedies for poor quality construction issues; and
- It signals to developers/builders that they are responsible for the production of their product.

The construction defect statute serves the same purpose as the quality control requirements in every industry, whether it is in the manufacturing of automobiles, aircraft, toys, agriculture, etc. That is, as a consumer has no way to assess the product quality (or safety) of a product, be it a home, a toy, an airline flight, procedures are in place through our regulatory or legal system to insure that the consumer receives the product as advertised. Without quality controls and avenues to remedy a problem, markets will not work efficiently.
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I. INTRODUCTION

As the country focuses on building for the future, many cities, including Denver, are working to accommodate population increases in a sustainable manner so that the generations to come can prosper economically with a high quality of life while conserving natural resources. The Denver Regional Council of Governments (DRCOG) brings together counties and municipalities from Denver and the surrounding areas to address regional issues with a focus on avenues to improve economic prosperity and enhance the quality of life for its citizens. DRCOG’s current MetroVision 2035 seeks sustainable development through collaboration that provides housing, employment opportunities, improved transportation and personal mobility, and diverse shopping and community activities for residents of all ages and incomes.

A major topic of agreement within MetroVision 2035 is the need to curb urban sprawl by increasing urban density, particularly around transit oriented developments (TODs), in order to provide the amenities and lifestyle opportunities associated with mixed-use pedestrian development (supported by transit services). Such development will not only reduce vehicle congestion and miles driven, thereby improving air quality, but will also improve many other aspects of life for our citizens.

MetroVision 2035 sets an overall goal to accommodate fifty percent (50%) of the region’s new housing and seventy-five percent (75%) of new employment in urban centers by 2035. This goal is intended to include a mix of housing that matches the ages, incomes, and preferences of our diverse population. Such a mix includes single-family homes, townhouses, condominiums, and apartments planned around transit oriented developments (TODs) to increase housing/urban density. Importantly, attracting these housing products will require new and quality employment opportunities within the region as well as amenities such as parks, shopping, etc.

DRCOG recognized the need to understand the characteristics of the high density housing market in order to accomplish the goal of creating a concentration of jobs, housing, shopping, and community activities oriented around TODs. To gain a better understanding of high density housing, DRCOG commissioned Environmental Planning Systems (EPS) to research and identify the factors and economic conditions that contribute to housing development generally and specifically within the Denver metro area. The EPS study reached two major conclusions.

- The first is that while there has been a resurgence of multi-family construction in the Denver metro area (obvious to anyone who has traveled in the area), most of this construction in recent years has been for apartments and little is for condominiums.
The second EPS conclusion is that, while numerous factors impact the market for apartments and condominiums, the root cause of the decrease in condominium construction is the cost associated with construction defects liability.

Various constituencies have taken issue with the EPS study in general and the conclusion regarding construction defects specifically. Professor Emeriti, Larry Singell, Sr. and Jane Lillydahl of the University of Colorado, Boulder economics department were retained to evaluate the EPS analysis. The professors were very critical of the EPS study, noting that it relied upon little or no data, biased information, and ad hoc analyses resulting in narrow and misleading findings.

Further, the Singell and Lillydahl report urged that the EPS report not be the basis for any new legislation without more rigorous analysis, as the unintended market consequences of providing additional protection to developers against construction defects litigation are to increase the likelihood of construction defects and to shift the costs of construction defects to buyers.

The Pacey Economics, Inc. study was commissioned to perform a more rigorous and more empirically based analysis of the market for housing products in the Denver Metro area and also to provide recommendations on how to move the Denver area toward the goals set forth in MetroVision 2035.

We explain the basic economic principles involved in the housing market and identify the key factors underlying the demand for and supply of housing products. We then collected more detailed and more specific empirical data to evaluate the impact of these factors on the Denver metro housing market. In the end, we concur with professors Singell and Lillydahl, and must strongly disagree with the EPS findings that construction defect liability issues stemming from the statute is the root cause for the lack of condominium construction in the Denver area urban centers and, rather, we find that:

- The reason for limited condominium construction over the past few years in the Denver Metro area is due to a simple economic principle—a decrease in the demand for condominiums (i.e., there are fewer buyers willing and able to purchase condominiums at market price). The decreased demand for condominiums includes factors such as lower real incomes, stricter lending requirements and greater costs for mortgage fees and insurance, greater amounts of student debt, and lower household formations, among others.
• Apartment construction has been on the upswing in recent years as the demand for apartments has increased relative to the demand for condominiums for reasons listed above as well as others detailed in Section V, resulting in more profitable rental markets.

• Peer cities (i.e., cities comparable to Denver in terms of population, age and income distribution, industry mix, land area, etc.) experienced similar decreases in condominium construction which affirms market forces other than construction defect liability are at play. Notably, San Francisco is not and should not be considered a “peer city” given the substantial differences in income and industry mix as well as land values and housing density (which will be addressed later in this report).

• Colorado statutes related to construction defects do not create more risk for construction companies than those in other states. Our findings, discussed in Section VIII, show no substantial differences in the statutes relating to construction defects and its remedies that would have a meaningful impact on development trends. Indeed, Colorado appears to have a healthy balance falling within the mid-range criteria, when compared to other states.

The remainder of this report documents the analyses supporting our conclusions that it is the decrease in condominium demand from decreased real income, increased lending requirements and home mortgage costs, later household formations, among other key factors, that has driven the lack of condominium construction, and not construction defects per se.

The good news, also to be discussed in this report, is twofold: the 2014 data is showing a healthy increase in condominium permits as the economic recovery is buttressing the demand for condominiums and there are more effective public policy decisions available to advance the goals expressed in MetroVision 2035.
II. THE MARKET FOR HOUSING

Unlike the movie *Field of Dreams* where a voice whispers to Kevin Costner “if you build it, he will come;” in the real world construction does not guarantee a buyer. Rather, people come to markets only if the interaction of supply and demand leads them there. The basics of the market for housing are described below.

- The supply of housing is dependent on the cost of land, labor, and materials as well as overhead costs (which include, among others, costs associated with construction defects). Most single family homes can be built in a few months, but several years can pass between the conception and completion of a multi-family structure. Because of the time required, the decision to build housing depends on the price developers expect to receive in the future. Of course, expected future prices are more uncertain but highly related to current market prices.

- Housing demand is dependent on a multitude of factors including income, age, marital status, credit availability, etc. Contrary to supply, the decision to buy (or rent) a home is largely based on the prevailing market price.

- Housing demand tends to be more sensitive to current market conditions such as financing options while the stock of housing is relatively fixed in the short run as it takes time for new housing to be constructed.

- That is, the supply of housing is slow to change, but changes in demand are almost instantly reflected in market price. In times of decreased demand, prices will fall quite quickly, and construction will slow or cease (as has occurred since the 2008 Great Recession). However, once demand recovers (which it ultimately will do since the demand for housing is directly linked to population growth), sales prices will rise and developers will resume construction.

- However, it is important to recognize the time lags required for new housing construction. Prices must rise long enough for developers to be convinced that the increase will continue into the future, and then time is required to actually build the structures. Therefore, modest increases in demand (e.g., a few consumers here and there desiring a condominium) are not sufficient to provide the financial incentives necessary to induce new condominium construction.

There is no argument in the economic profession about these basic principles associated with the interaction of
supply and demand. Thus, the reduced demand for housing ownership will, as described above, reduce the price of the product, NOT the cost of the product, making it less profitable for suppliers (developers) to build for ownership vis-à-vis rental.

Since 2008, the demand for housing products has been impacted by more strict lending requirements, tougher credit scoring, increased household and student loan debt, slow or no growth in wages, etc., all reducing the able component of the demand for housing, which, in turn, negatively affects the price a buyer is willing to pay for housing.

The increased uncertainty in employment stability, the desire or need for mobility, later age for marriage rates, changes in the ethnic composition with an older age for home ownership, the reduced (perceived or real) opportunity to “flip” a property, etc. also play a role as these factors impact the willing component embedded in the demand for housing. The trend of these demographic attributes all serve to dampen the demand for housing ownership, which, in turn, negatively affects the price a buyer is willing to pay for housing. Notably, there appears to be no lack of housing products available (detached or attached) at high end prices (which are down but still active in the market) as in this sector of the market buyers are both willing and able to purchase a housing product of their choice, i.e., there is a demand for such housing.

That said, the overall demand for ownership has been weak over the past several years. However, as the population requires some kind of housing, the alternative product is renting and, not surprising, the demand for rental units over this same time frame has been strong. And strong demand for rental properties will increase its prices and increased prices will generate the opportunity for increased profits to the suppliers (developers)—inducing them to construct apartments.

This is a major reason for developers and builders constructing apartments as opposed to ownership units; profits are better for apartment construction because the basic economic determinants that generate increased demand for housing ownership have been extraordinarily weak over the past several years.
III. BASIC ECONOMICS: AN OVERVIEW

The following discussion is a bit academic but is designed to offer a visual illustration of the impact of a factor that affects the demand for or supply of housing products. The graphs below offer a simple economic primer on how, given other things remaining unchanged, impacts on demand and supply affect the price and quantity of a good sold. Following these graphs, in Section IV, are Tables I and II which identify the key determinants (factors) in the makeup of the demand for and supply of housing and the direction these factors will have on price and quantity (again, without changing other factors).

First let us review the market demand for housing. This example considers housing generically but this phenomenon applies to any housing product. (This example does not go into the machinations of how the market demand is actually calculated or explain the concept, it doesn’t need to; suffice to say it is common sense that there are fewer high income households relative to middle and lower income households and hence there would naturally be fewer high priced housing units.)

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Step 1: Demand

- The downward sloping line is the demand (D) for a housing unit. The demand line tells us how many units will be “demanded” at specific prices.

- As an example, at $400K there is a demand to buy 100 housing units; while at $100K there are some 250 housing units to be purchased.

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Step 2: Shift in Demand

- Let us now assume the lending requirements are tightened such that instead of a 3% down payment being required it became (almost overnight) a 10% down payment required.

- An increase in the required down payment (nothing else in the economy changing) will mean, most, if not all consumers will be able to purchase less,

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1 For more explanation of the machinations of the housing market please reference “Demographic Shift From Single-Family to Multi-Family Housing” by Jordan Rappaport, Federal Reserve Bank of Kansas City.
generally, across all levels of income and all prices.

- This is illustrated in the graph below where the original demand has now shifted down at every housing price – as demonstrated by $D'$.

- Now there are only 50 consumers demanding a housing unit at $400K and only 175 at the $100K housing unit price.

Consumers, especially lower and middle income earners are less likely to have additional monies needed for a higher down payment or the higher mortgage transaction fees, etc., (while high income earners may still be “able”), such that it is increasingly more difficult for those consumers seeking lower priced housing.

Thus, an increase in lending requirements with no other changes to the market will reduce the quantity demanded for housing units at all housing price levels (although less so at the higher income and housing prices). Table I to follow in Section IV shows (by use of up/down arrows) the positive and negative impact on price and quantity for each of the factors considered key in the demand for housing.

Having explained the basic premise of the market demand for housing, let us now turn to the factors that explain the supply of housing, i.e., what builders are willing and able to supply at certain selling prices of the housing unit. (Again, as with demand, the detail of how housing market supply is specifically determined is not discussed here, nor will it change the phenomenon.)

**Step 3: Supply**

- The upward sloping line is the supply of housing units ($S$) developers are willing to build at the specified prices they are willing to sell.

- To construct a housing unit, the supplier incurs costs – costs of land, labor, materials, etc. as well as costs for interest on construction loans, insurance, etc. in addition to the profits that need to be included. All of these costs will impact how many housing units will be built and at what price; naturally the higher the costs, the higher the housing price.

- In this example, at $100K a house there would be 50 housing units offered by suppliers while at $400K the number of housing units that would be built is 200.
Step 4: Shift in Supply

- Now for similar reasons as discussed regarding demand, if the cost of materials (e.g., lumber, cement, labor) increases (again considering no other changes) it will affect the cost to build a housing unit and the new quantity supplied, \( S' \), shows fewer units will be offered at the various prices.

Thus the “market for housing” can be depicted on the graph below.

Step 5: Supply and Demand

- Integrating supply and demand gives the average market price such that markets will clear, i.e., so that the quantity demanded equals the quantity supplied.

- Of course, there will be housing units sold at lower prices but fewer housing units will be built at the lower price than consumers would desire - but it is because suppliers are not willing and/or are not able to offer more at the lower price. Conversely, suppliers would desire to build more high priced housing units but have no consumers to sell them to.

- Hence, with more strict lending requirements for consumers to purchase a housing unit and increased costs for suppliers to build there will be fewer units at lower average prices in the market.

Now, as in any market, supply and demand do not work in isolation of each other, but rather are interrelated;
If you then sort this general housing market into various price points and sectors, it is easy to recognize that most of the major market factors that impact demand such as real income, unemployment, tight lending requirements, student debt, etc., have weighed more heavily in the past several years towards the reduction in the demand for housing units (and concomitantly the supply of housing), especially for middle and lower income households.

It comes as no surprise to economists and hopefully this primer now makes it clear to policy makers why there are little to no condominiums being built in the low/middle price points. It is because there has been little or no demand for such.

The following section describes the key determinants (factors) in the makeup of the demand for and supply of housing and the positive or negative impact these factors will have on price and quantity (and implicitly on profits to builders).

**IV: FACTORS AFFECTING DEMAND FOR AND SUPPLY OF HOUSING**

Tables I and II summarize the multiple factors that play an important role in determining the demand for and supply of home ownership, noting the trends in these factors over the last several years, the subsequent impact on the demand or supply, and the concomitant impact on prices and quantity (which ultimately affects profitability). Importantly, the factors identified in our analysis are consistent with the factors considered relevant in the EPS study; however, our view, like that of Drs. Singell and Lillydahl, is EPS failed to fully understand the interaction of these market variables and made findings that were either inconsistent with the limited data they presented or inappropriate given the data cited in their report or the data reviewed by our firm. The supporting data for each of these factors, plus additional factors Pacey Economics identified as relevant, are described in more detail in Sections V and VI.
Table 1: Factors Affecting the Demand for Home Ownership

<table>
<thead>
<tr>
<th>Factor</th>
<th>Trend</th>
<th>Effect on Demand</th>
<th>Effect on Price</th>
<th>Effect on Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Income/Assets (Able)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Real Income</td>
<td>Real incomes (i.e., inflation adjusted income) as measured by the Current Population Survey have fallen for all age groups since a decade ago, particularly for younger individuals (26-40 years old) leaving traditional first-time homebuyers less able to purchase a home.</td>
<td>↓</td>
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</tr>
<tr>
<td>Unemployment</td>
<td>Not only have real incomes decreased, but employment opportunities have not returned to pre-recession levels for the Denver Metro area per Bureau of Labor Statistics data.</td>
<td>↓</td>
<td>↓</td>
<td>↓</td>
</tr>
<tr>
<td>Personal Savings</td>
<td>Bureau of Economic Analysis data report personal savings as a percent of disposable income has declined drastically since its peak in the 1970s; while savings increased during the Great Recession due to lack of consumer confidence, rates have nonetheless remained low indicating generally less money available for down payments.</td>
<td>↓</td>
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</tr>
<tr>
<td>Student Debt</td>
<td>College Insights reports that average student debt of four year college graduates has risen nearly 67% over the past decade, placing more of a burden on disposable income and the ability for younger generations to acquire a home mortgage.</td>
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</table>
### Table 1: Factors Affecting the Demand for Home Ownership (Continued)

<table>
<thead>
<tr>
<th>Factor</th>
<th>Trend</th>
<th>Effect on Demand</th>
<th>Effect on Price</th>
<th>Effect on Quantity</th>
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</thead>
<tbody>
<tr>
<td><strong>Lending (Able)</strong></td>
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<tr>
<td>Requirements</td>
<td>Mortgage lending/credit availability tightened as a result of the housing bust when delinquencies and foreclosures skyrocketed from unsustainable mortgages; as a result, debt-to-income ratios were capped, stringent documentation and verification was required, among other restrictions.</td>
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</tr>
<tr>
<td>Credit Scores</td>
<td>After the subprime fallout/mortgage crisis in 2008, lenders began and continue to require higher credit scores (i.e., higher quality borrowers) to be eligible for a loan with no expectation to relax this requirement to pre-recession levels, hindering borrowers’ ability to obtain financing.</td>
<td>↓</td>
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</tr>
<tr>
<td>Fees/Insurance</td>
<td>Higher upfront origination fees and costs for mortgage insurance has resulted in increased costs and payments for mortgagees again, dampening the ability to afford a mortgage loan.</td>
<td>↓</td>
<td>↓</td>
<td>↓</td>
</tr>
<tr>
<td>Interest Rates</td>
<td>The Federal Reserve Bank has chosen to keep interest rates near all-time lows which has helped to boost the housing industry by increasing a borrower’s ability to obtain financing; however, if interest rates begin rising there will be a reverse impact on demand, price and quantity.</td>
<td>↑</td>
<td>↑</td>
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</tr>
<tr>
<td>Factor</td>
<td>Trend</td>
<td>Effect on Demand</td>
<td>Effect on Price</td>
<td>Effect on Quantity</td>
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<tr>
<td><strong>Demographics</strong></td>
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<tr>
<td><em>(Willing)</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marriage Rates</td>
<td>The <em>Current Population Survey</em> shows if someone is married they are more than twice as likely to own a home; but, the proportion of younger generations not married or delayed in marriage is increasing.</td>
<td>↓</td>
<td>↓</td>
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</tr>
<tr>
<td>Delayed Household</td>
<td>Likely due to other factors mentioned, the percent of younger people still living with their parents is trending upwards.</td>
<td>↓</td>
<td>↓</td>
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</tr>
<tr>
<td>Formation</td>
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</tr>
<tr>
<td>Age</td>
<td>The younger generations are making up less of the Colorado urban population whom are typically first-time homebuyers.</td>
<td>↓</td>
<td>↓</td>
<td>↓</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>The <em>State of the Nation’s Housing</em> study indicates first-time homebuyers among minorities are generally older; and with an increasing younger minority urban population, <em>willing</em> homebuyers has been decreased.</td>
<td>↓</td>
<td>↓</td>
<td>↓</td>
</tr>
<tr>
<td>Factor</td>
<td>Trend</td>
<td>Effect on Supply</td>
<td>Effect on Price</td>
<td>Effect on Quantity</td>
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<tr>
<td>--------</td>
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</tr>
<tr>
<td>Costs</td>
<td>(Willing/Able)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Land Costs</td>
<td>Land values sharply decreased following the Great Recession allowing for more home construction given other things constant; however, given the increased supply, i.e. higher quantity, puts downward pressure on the price which makes it less profitable for developers to build.</td>
<td>↑</td>
<td>↓</td>
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</tr>
<tr>
<td>Labor</td>
<td>Despite the recession, construction labor costs have continued to rise affecting the ability of developers to supply housing.</td>
<td>↓</td>
<td>↑</td>
<td>↓</td>
</tr>
<tr>
<td>Lending Requirements</td>
<td>Credit availability in commercial lending for multifamily construction tightened as a result of the housing bust, for example, requiring higher pre-sales, a majority of units owner-occupied, lower loan-to-value ratios, sufficient budget coverage, etc.</td>
<td>↓</td>
<td>↑</td>
<td>↓</td>
</tr>
<tr>
<td>Interest Rates</td>
<td>Interest rates have been low, decreasing the costs for construction and hence, supporting an increase in supply.</td>
<td>↑</td>
<td>↓</td>
<td>↑</td>
</tr>
<tr>
<td>Insurance Premiums/Construction Defect Legislation</td>
<td>Increased insurance premiums, whether arising from construction defect litigation (litigation costs, costs to repair, costs to mitigate, i.e. third-party quality assurance, etc.) or other factors, will increase costs to the builders/developers. However, we have been unable to obtain reliable empirical data due to the highly guarded information from both builders and insurance companies. Therefore, the trends in these costs cannot be ascertained and cannot be analyzed until such information is forthcoming.</td>
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</table>

\[^2\] We encourage builders/developers to submit information regarding insurance premiums, costs of litigation/lawsuits, etc. so a proper analysis of these factors may be performed. Further, a legislative oversight and review of insurance rates could allow appropriate insight into construction insurance rate trends.
Table I simply provides the reasons for what is known by the most casual observer, that the demand for housing fell following the 2008 recession while Table II delineates the major costs incurred over the most recent years by developers/builders.

Further evidence of the decreased demand for condominiums is illustrated in Figure 1 which shows a surplus of condominiums constructed in 2009 (reflected in the increase in number of unsold units). Likely in response to the slow sale of condominiums during that period is the supply response to slow sales, i.e., the number of permits issued for condominium construction in the Denver area (which may or may not result in actual buildings) between 2006 and 2013 has also fallen dramatically. Figure 1 also shows that the number of the condominium completions for the Western region of the U.S. parallels the Denver experience for decreased condominium activity. Of note, the shift between the Denver permits and Western completions likely reflects the time it takes, from one to two years, for a building to be completed after a permit is issued.

The decreased demand for any type of housing ownership is likely directly linked to home mortgage loan applications (i.e., the more applications, the more home loans being sought). Figure 2 visually and simply demonstrates that the total applications (for mortgage loans for one to four family dwellings excluding manufactured homes) decreased by more than sixty percent (60%) from its peak in 2005 to its recent bottom in 2011.

Sources: U.S. Census Bureau (Western Region includes CO, NM, WY, MT, AZ, UT, ID, WA, OR, NV, CA and AK); Denver Metro Area Housing Diversity Study
The consequences of the extensive changes in demand that have been experienced in recent years are changes in the market values of rented-homes versus owned-homes. The market value of apartments relative to the market value of detached homes is indexed and illustrated in Figure 3.3

Figure 3 shows that the market value of apartments relative to detached homes has grown steadily since 2006, creating a clear market incentive to build apartments. Further, our observations on historical condominium prices from various data sources (i.e., housing market data websites) indicates the growth in apartment values relative to condominium values has been even greater than to detached housing. (We are seeking permission to reprint this information.)

Given the market conditions of falling value in the face of decreased supply and longer holding times to sell, it would take a special set of circumstances for a rational developer to construct condominiums rather than apartments.

---

3 Figure 3 plots the ratio of the rental rate of 2-bedroom, 2-bathroom apartments to the Case-Shiller home price index, normalized to 100 in the year 2000. Of note, the value of an apartment is the present value of the expected future stream of rents which, assuming a fairly constant capitalization rate and expected future rents proportional to actual rents, is proportional to current rent.
V: THE KEY DETERMINANTS IN THE DEMAND FOR HOUSING

The data underlying the trends in housing demand, supply, and prices summarized in Table I are discussed in more detail in this section. The sources and cites for this data are oftentimes noted on the chart but also in the text or appendix of this report.

**Income/Assets (Able)**

**Real Income**

Figure 4 below identifies current (2014) income as a percent of real income (i.e., inflation adjusted income to reflect actual purchasing power) by age group as compared to a decade ago (from the 2001-2003 time frame). It is well known (and reflected below) that the recession had the largest effect on the income of the younger generation (generally the first-time homebuyers), although every age group experienced some loss of purchasing power. These lower real incomes result in a downward “shift” in the demand for nearly all goods and services (or savings), including housing. Household income among the young population (26-30 year olds) is only 82.7% of the income earned approximately a decade ago.

![Figure 4: Current Real Income as a Percent of Real Income from Approximately a Decade Ago](source)

**Unemployment**

In addition to falling real income, the effects of the recession on the job market resulted in high unemployment rates in the Denver metropolitan area (as well as nationally), especially among the younger workers (as shown in Figure 5b) who have not returned to pre-recession earnings levels. Those experiencing a spell of unemployment will not be able to obtain mortgages (given tenure in job, debt-to-income requirements, credit, etc., i.e. able) and they are less likely willing to purchase a home for lack of stability, income and loss of potential for mobility. Figure 5a demonstrates that the unemployment rate for all ages was a record low in 2000 (some 2.5%), and was still below 5.0% in 2008 but increased to a high of 9.0% in 2010 before gradually falling to the current...
unemployment rate of 5.5%. When sorted by age for the Denver metro area, the younger aged workers have experienced and continue to experience higher rates of unemployment. (Importantly, these statistics do not include those who have left the labor force or are underemployed which would be a further dampening on the demand for housing.)

**Figure 5a: Unemployment Rates for the Denver Metropolitan Area**

![Unemployment Rates Chart]

**Personal Savings**

Another well known (and intuitive) factor affecting the demand for housing is personal savings, especially in the wake of mortgagers requiring larger down payments and higher transaction costs (e.g., origination fees, mortgage insurance, etc.). Savings as a percent of disposable income fell to a bleak 3% in 2007 as people spent a significant portion of their money on goods and services including housing; but, as consumer confidence plummeted during the recession, savings rates have recovered to pre-recession levels, as presented in Figure 6. Nonetheless, the low savings rates relative to history reduces the ability to make down payments and pay higher fees on mortgage loans.

**Figure 6: Personal Savings as a Percent of Disposable Income**

![Personal Savings Chart]
**Student Debt**

Perhaps one result of suppressed savings rates is the increase in debt students have faced over the past decade. Figure 7 below shows that the average debt of Colorado four-year college graduates increased from approximately $15,000 in 2004 ($18,200 in 2012 dollars) to nearly $25,000 in 2012 (the most recent year of available data), over a one-third increase in real dollars. Such debt decreases the demand for housing, given debt-to-income requirements (as well as the common sense of consumers). Additionally, to the extent students default on their debt resulting in lower credit scores, the demand for future homeownership is further reduced.

**Lending (Able)**

**Requirements**

Following the bust of the housing bubble which served as a catalyst for the Great Recession, mortgage lending tightened and government agencies had to step in to provide stability to the housing market. Subsequent restrictions on lending and/or tightening credit conditions required higher quality borrowers, i.e. higher credit scores, higher down payments (lower Loan-to-Value ratios (LTV)), lower debt-to-income ratios (DTI), as well as strict verification of documentation and the ability to repay in underwriting. (In fact, it was mandated in 2013 that no loans were to have debt-to-income ratios exceeding 43%, slowing the demand for housing in early 2014.) The increased restrictions have further hindered demand for homeownership over the recent past as it has made buyers less able to obtain lending, particularly when compounded with the various factors mentioned previously, including increasing debt, lower real incomes, etc.

Figure 8 shows not only the decrease in total applications as mentioned in Section II, but also highlights the increased rate of denials of those home applications, suggesting the more strict lending requirements empirical impact on housing demand.
Figure 8: Total Home Mortgage Loan Applications for 1-4 Unit family Dwellings

![Graph showing total home mortgage loan applications from 2004 to 2013. The graph indicates a decrease in applications over time, with a peak in 2007. The percentage of applications denied is also shown, decreasing from 16% in 2004 to 8% in 2013.]

Source: Home Mortgage Disclosure Act, Federal Financial Institutions Examination Council

Figure 9 represents the decrease in Fannie Mae loans with loan-to-value (LTV) ratios greater than 90% (i.e., requiring higher down payments) as well as the number of loans with credit scores below 620 over the recessionary period.

Figure 9: Fannie Mae Single Family Loans

![Graph showing the percentage of loans with LTV ratios greater than 90% and the percentage of loans with credit scores below 620 from 1999 to 2011.]

Credit Scores

Figures 10 and 11 indicate mortgage companies Freddie Mac and Fannie Mae are now requiring higher credit scores to be eligible for a loan (conventional loans). (The same has been true for the Federal Housing Administration (FHA) loans which are typically more applicable to first-time homebuyers as they require as little as 3.5% for a down payment.) The higher credit scores inherently remove a subset of the population that would even be willing to buy a home but due to higher credit standing are now not able to meet the requirements.

Figure 10: Average Weighted Credit Scores for Freddie Mac 30-Year Fixed Rate Loans

![Graph showing average weighted credit scores for Freddie Mac 30-year fixed rate loans from 1999 to 2011. The credit scores range from 712 to 780.]

Source: Freddie Mac

Figure 11 also shows conventional loans not only have higher weighted average credit scores, but also have essentially stopped lending to borrowers with scores less than 620 during the recessionary period.

![Graph showing the percentage of conventional loans with LTV ratios between 90% and 100% and the percentage of loans with credit scores below 620 from 1999 to 2011.]

Source: Fannie Mae, Credit Characteristics of Single-Family Business Acquisitions
Increasing Fees/Mortgage Insurance Premiums

As noted earlier, increasing fees and costs associated with obtaining a mortgage has made homeownership less affordable as well. Even as restrictions on credit lending start to relax, the increased transaction fees and interest rates and rising home prices (requiring larger down payments) negatively impact the opportunity for home ownership.

Initial fees and charges for conventional loans have increased from 0.45% in 2005 to 1.30% (nearly three-fold) in 2014 shown in Figure 12. Although seemingly small on a $200,000 mortgage, this increase will amount to another $1,700 up front charge to the homebuyer.

FHA loans also saw an increase from a low of 1.25% to a set 1.75% for the upfront Mortgage Insurance Premium (UFMIP). Again, although seemingly small, the half percent increases the upfront fee by $1,000 on a $200,000 mortgage.

The annual mortgage insurance premiums themselves have also increased substantially. Figure 13 shows the increase in the annual premiums for FHA loans. Not only did the charge change from a low of 0.50% circa 2008, to current annual rates of 1.30% (more than double), but also the time required to pay the mortgage insurance premium was dramatically increased resulting in further long term costs to the buyer.

For example, prior to 2013 the borrower was allowed to stop paying the premium once the loan-to-value (LTV) ratio reached 78%. Now, for any
loan with an original LTV ratio of greater than 90% mortgage insurance will have to be paid for the entire loan (or thirty years maximum) or for loans with an original LTV less than 90% the premium must be paid for 11 years. Considering many FHA loans are for buyers who cannot afford to pay a larger down payment, these costs substantially increase the cost of owning a home.

Figure 13: Mortgage Insurance Premiums for FHA Loans with Terms Greater than 15 Years

Federal Reserve Board (Fed) has used this monetary policy to maintain low interest rates to help in the recovery of the failed housing market. The Fed recognizes if they did not keep interest rates artificially low demand would be even weaker. Clearly, if/when the Fed increases interest rates, this increase will serve to suppress demand; the Federal Reserve understands this phenomenon and has expressly noted it will maintain low interest rates until markets recover sufficiently so as to minimize the negative impact on demand from an increase in interest rates.

Figure 14: Interest Rates on Conventional 30 Year Fixed Rate Non-Jumbo Single Family Loans

Interest Rates

Over the past several years recent interest rates which have been at historical lows, as noted in Figure 14, represent one factor that actually would assist/spur homeownership demand and/or increase borrowers’ ability to purchase a home. The
Demographics (Willing)

Marriage

As discussed above, the demand for housing (or any good or service) is a function of both the ability to buy and the willingness to buy. The following section discusses the willingness component of demand, which is largely a function of the demographic characteristics of society. Marriage is highly correlated to homeownership. Figure 15 demonstrates that married individuals ages 26 to 30 are more than twice as likely to purchase a home.

Figure 15: Likelihood of a 26-30 year old Owning a Home by Marital Status

The combination of these two phenomena is yet another reason for the decrease in the demand for housing of those in prime age for first-time home ownership in the Denver metro area.

Delayed Household Formation

Lower real incomes, higher debt obligations, and lower marriage rates all support individuals delaying forming a household of their own or remaining at home with their parents for longer periods. Naturally, this phenomenon will serve to decrease the demand for home ownership; however, this may be a sign of “pent-up” demand and if these individuals find themselves in a position to buy, we could see a resurgence in the housing market. Figure 17 shows that the percent of 26-30 year olds living at home has increased by some 30% in
the last decade for Colorado and the increase is consistent with the national market.

**Figure 17: Likelihood of an Urban 26-30 Year Old Living in their Parent's Home**

![Graph showing likelihood of urban 26-30 year olds living in parent's home]

*Source: Current Population Survey*

**Age**

Another factor in the demand for housing is the age distribution of society. Data from the 2014 *The State of the Nation's Housing* by Harvard University shows that individuals in their twenties and early thirties are the most likely to be first-time homebuyers. The urban Colorado population that is in their twenties was 20% of the overall population in the 1970s, but has steadily decreased to less than 15% of the population (over a 30% decrease), as noted in Figure 18.

**Figure 18: Percent of Urban Colorado Population in Their Twenties (20-29)**

![Graph showing percent of urban Colorado population in their twenties]

*Source: Current Population Survey*

Although individuals of older age often switch homes (either upsizing or downsizing or changing locations), they do little to effect the demand for the overall stock of housing, but are relevant to the mix of housing products. As baby boomers downsize, they will change the mix of the inventory/supply of existing homes. To the extent baby boomers downsize at a greater rate than the upsizing of their younger household counterparts, there will be a net shift in the mix of housing products.

**Ethnic Diversity**

Ethnicity is also a factor in the decrease in the demand for homeownership. *The State of the Nation's Housing* finds that non-Caucasians are less likely to own a home (as illustrated in Figure 19), and they generally purchase their first home later in life.
The percent of non-Caucasians in urban Colorado areas has increased from 31% to 37% since 2000 (an increase of almost 20%, see figure 20), which has likely decreased current demand for homes. However, as discussed earlier, this phenomena is likely to have just delayed the demand.

VI: THE KEY DETERMINANTS IN THE SUPPLY OF HOUSING

Land Costs

A key factor in any home builder’s decision to supply housing is the value of real property (i.e., the land the structure will be built on), as this is a direct and substantial portion of the overall cost to the builder. This factor not only affects the decision of whether or not to build, but also what type of housing to build, single family housing or multi-unit housing. That is, as the value of land increases the cost effectiveness for multi-unit housing also increases. Figure 21 indicates both national and Denver metropolitan land values increased markedly in the early 2000s, fell dramatically during the recession, and recovered in recent years to near “pre-bubble” levels.

This factor alone would, if all other factors in the economy remained unchanged, increase the supply of housing and decrease the price of housing over the recessionary period. However, given this time frame, many other supply and demand factors changed and as they are integrated, as demonstrated in Section III of the study, overall new supply of housing in Denver as well as across the country fell after the 2008 downturn and is now just recovering. That is, given the decreased supply of housing it is clear that this factor has been outweighed by other factors discussed in the following pages.
Construction Labor Costs

A major factor driving the cost (and thus supply) of housing is construction labor costs. Despite the Great Recession, payroll data indicates the average pay of an employee in the construction industry steadily increased from 2005 to 2012, as demonstrated in Figure 22. Further, as reported by the Associated General Contractors of America, construction companies have repeatedly indicated they have a difficult time finding skilled workers.

Additionally, Denver construction labor costs have been found to be substantially more (15 to 20%) than the national average for this class of worker, increasing Denver area builders’ overall costs relative to the national market and limiting the ability to make simple comparisons between Denver and other cities/communities.

Overall Construction Costs

A more all-encompassing measure of overall new construction costs comes from the Producer Price Index (PPI) published by the Bureau of Labor Statistics. This index includes all of the costs of building weighted by their respective usage, as reported by construction establishments. These costs include labor, materials, etc. The Producer Price Index (shown on Figure 23 below) shows that the costs of new construction increased by approximately 30% from 2000 to 2013 putting downward pressure on the overall supply of housing.

Figure 21: Average Single Family Home Land Values (Home Value minus Structure Cost) by Year

Figure 22: Annual Payroll per Employee in the Construction Industry

Figure 23: Overall Construction Costs
Lending Requirements

It is understood lending requirements also became more stringent for commercial mortgage loans, including higher pre-sales requirements for condominium projects (at least 50% for FHA approved condos), no more than 75% loan-to-value (LTV) ratios, sufficient budget coverage, etc. as banks dealt with catastrophic losses on mortgage loans.

Even with low interest rates persisting for suppliers (builders) as with consumers, as requirements became more strict, costs increased for suppliers.

Insurance Premiums/Construction Defects

In and of themselves, an increase in the construction insurance premium, for whatever reason(s), will increase the costs for the builder and reduce the supply of housing products like any other cost factor. The costs for insurance coverage can increase because of inflation, increased coverage, real or perceived risks, history of the need for coverages, construction defects, etc.

It is understood the liability for construction defects are often borne by the insurance carrier and can include the costs to repair certain defects, litigation costs (e.g. experts, attorney fees), etc. but may also include injury claims amongst other claims. Certainly, no one disputes that an increase in the construction defects claims for any reason (e.g., worker errors, material quality, soil issues) by an individual developer/builder or the industry in general could/would likely increase the cost of insurance coverage.

Some limited industry-wide data for detached homes indicate the average insurance premium cost ranged from 0.6% to 1.0% of the overall building costs, suggesting construction defects liability costs are not substantial in this sector of the housing market. However, the only available information on insurance premiums for condominium construction was noted in the EPS report and simply
anecdotal noting substantial increases. This snippet of information is wholly insufficient to draw any reliable or credible conclusion, and begs questions such as: was this premium increase an inflationary adjustment similar to other cost increases? Was the increase because of the risk history of a builder? Was the increase due to increased coverage? Did the increase result in insurance premium costs rising from 0.5% to 1.0% or 1.0% to 2.0%, etc.?

Without more complete information from developers, builders, and insurers, no legitimate findings can be drawn. Pacey Economics has diligently searched for objective empirical data regarding specific insurance costs (including contacting the state Colorado Division of Insurance) but has been unable to obtain relevant empirical data.

Pacey Economics has also searched for objective empirical data regarding construction defects and associated litigation costs including:

- costs to repair defects
- costs to increase quality
- litigation costs
- frequency of lawsuits
- frequency of “frivolous” lawsuits

that can be properly used to evaluate the builder’s claims and the EPS claimed findings and to correlate with construction insurance premium costs.

We searched public records for the filing of construction defects lawsuits involving existing condominiums and for information regarding settlements, litigation costs, etc. We concluded that sufficient unbiased data for analysis was not available.

Pacey Economics finally turned to construction company 10-K filings as a source of objective data. A 10-K form is an annual report required by the Security and Exchange Commission and provides a comprehensive summary of the company’s financial performance, including audited financial statements, quantitative and qualitative disclosures about market risk, among other market and investor information. Pacey Economics reviewed the 10-K filings for several past years for each company EPS had interviewed. There was no mention or disclosure (required by law) of construction defect liability matters creating additional risks, critical legal proceedings, or the like. Hence, builders apparently view the costs associated with construction defects as just one of the many typical costs of doing business including the costs of land, labor, and materials.

*However, like insurance premium data and costs, construction defects data do exist, and are held by the same developers and builders who claim their costs are being driven up by construction defects statutes. Since the groups that hold the data needed for objective analysis are the same groups that would benefit by the*
proposed changes in legislation, it is appropriate that they make, or the legislature mandate, that information be made available for study and debate in the public forum.

VII: CRITIQUE OF EPS FINDINGS

The EPS study concludes that Colorado construction defect statutes and the associated risks and costs are the reason builders have stopped condominium construction in the Denver Metro area. We strongly disagree and find the EPS conclusion to have no basis, empirically or methodologically.

First, the information upon which EPS formed its conclusion is painfully weak and inappropriate as it is based on a limited number of subjective interviews. These interviews were with developers, builders and contractors, insurance brokers, attorneys (generally representing developers/builders), lenders and architects, where most, if not all, of the interviewees have a vested interest in passing legislation that extends additional protection to developers and builders. Any credible analyst would view this as a biased sample and any conclusions drawn from the resulting information would not be reliable.

Curiously, although EPS finds construction defects liability as the culprit in the lack of condominium construction, they qualify their finding by noting

“...the perspectives summarized below reflect more of the development industry and should be recognized as one side of the discussion”

which suggests EPS understands the bias in their analysis. Second, as discussed at length in Section III, the level of residential construction, be it detached homes, condominiums, or apartments, is the outcome of a market process where both buyers and sellers come together to establish a market price. That market price then creates incentives to build the type of residences being demanded in the market.

The EPS report failed to recognize the fundamental market process underlying residential construction or to consider the multiple reasons for the lack of condominium availability in the Denver Metro area or its urban centers.

EPS did not recognize that most of the reasons for a lack of condominium construction stem from the lack of demand (over these past few years) for such housing. Further, it should be emphasized that the costs (including insurance premiums for construction defects issues) associated with construction defects is in no sense evidence of “market failure.”
Next, EPS claims that the core problem underlying the lack of condominium construction is that construction defects statutes in Colorado create more risk and additional costs for developers and builders in Colorado than in other states, again, based on subjective interviews. While the statutes, for all states, are public information EPS did not summarize or identify or cite the construction defects statutes of any state. We do.

What we found is that the Colorado construction defect statutes are very similar to those in other states, and some provisions in the Colorado statutes are more favorable to builders than existing statutes in other states.

The details of our study of the relevant statutes are presented in Section VIII.

EPS also claims support for their findings by presenting a quantitative analysis attempting to demonstrate that the costs associated with construction defects are so high as to preclude construction. The EPS analysis is based on non-empirically founded and non-verifiable assumptions regarding levels of insurance coverage, insurance premiums, quality assurance costs, and additional subcontractor costs.

None of the EPS assumptions used in their “example” are supported by any verifiable data or cited empirical evidence.

All of the values utilized in the EPS example are based on the subjective and admittedly one-sided interviews described earlier. Clearly, as Singell and Lillydahl also noted, the EPS methodology does not meet any acceptable standard for quantitative analysis.

The EPS analysis concludes that construction defects litigation increases condominium construction costs by approximately $15,000 per unit. Even if this value is accepted for purposes of the following discussion (recognizing we take issue with the EPS assumptions as there is no empirical basis for them) it does not lead to the EPS finding.

First, EPS applies this cost increase to a situation in which a builder is just at the break-even point in profitability; yet under this assumption any additional cost, which could easily arise from labor, materials, or land, would halt construction in the EPS scenario—rendering the EPS scenario irrelevant.

Pacey Economics has additional problems with the EPS “example.” The EPS price increase of $15,000 (which corresponds to $15 to $10 per foot for a 1,000 to 1,500 square foot condominium) is well within the range of year-to-year variability actually experienced in the market. To further put the amount in perspective, a $15,000 price increase will be amortized by the buyer over 30 years,
rendering it a relatively small barrier to purchase.

Other demand factors (e.g., reduced income, higher down payment requirements or fees and insurance) would be expected to have more dramatic impacts on the ability of the buyer to make monthly payments.

For example, several of the demand factors will result in higher upfront costs creating even greater barriers to purchase. One such cost, the increase in lending requirements from a 3% down payment to a 10% down payment will require an additional $14,000 upfront cost to the buyer of a $200,000 loan. There is no amortizing this cost for the buyer. Additional upfront or ongoing costs for the buyer include the increases in origination fees and mortgage insurance not to mention the potential reduced ability to pay given real wage decreases.

Clearly, the impact of a $15,000 increase in cost, even if could be established as legitimate and even if it can be fully passed on to the buyer, presents less of a barrier to a buyer than the demand factors noted in the previous paragraph.

Finally, for reasons discussed in Section IX EPS inappropriately considers San Francisco as a peer city/community. Use of San Francisco leads to further distortions in the EPS findings.

VIII: CONSTRUCTION DEFECTS
STATUTES

Statute of Repose

A statute of repose is a statute that cuts off the legal rights of a party if they notice or see a potential problem but fail to make a claim within a deadline specified in the statute where the time line commences upon “substantial completion” of the housing product. That is, a homeowner who moves in three years after “substantial completion” of a housing product will have 3 years less to identify a construction problem than the homeowner who moved into a unit on the day of “substantial completion”.

Colorado has a statute of repose of six years with a two year extension if the cause of action arises during the 5th or 6th year after “substantial completion”.

- There are thirty four (34) states that have a longer statute of repose than Colorado.
- Four (4) states have a statute of repose shorter in duration than Colorado, and nine states have the same duration of statute of repose.
- Twenty (20) states (including Colorado) also allow extensions of the statute based on when the defect was discovered.
The fact that Colorado has a shorter period of repose is beneficial to the builder in that homeowners must file a suit typically within six years in order to file a claim as opposed to other states, twenty-nine (29) of which have ten years or more with which homeowners may file a claim.

**Statute of Limitations**

The Colorado statute of limitations is a time limit that requires homeowners to file a suit within two years of discovering a defect. Importantly, the discovery of a defect is defined as the first time a problem is identified, regardless of whether or not the problem is understood to be from a construction defect.

**Damages**

When it comes to damages, *Colorado Revised Statute section 6-1-113(2)(a)(III)* allows a party to collect treble damages if the conduct is determined to be of bad faith; however and importantly, since such damages are capped at $250,000 the “treble” is a bit of a misnomer. Out of the twenty nine (29) states surveyed, only three states do not allow punitive damages. Colorado, along with twenty (20) of the twenty-nine (29) other states surveyed, follows a comparative negligence process. This reduces the amount of damages that a plaintiff can recover based on the degree to which the plaintiff’s own negligence contributed to cause the injury, thus a builder is only liable for their portion of responsibility.

Additionally, Colorado does not have joint and several liability, except under egregious circumstances. Out of the 29 states surveyed, 14 had joint and several liability which allows a claimant to pursue an obligation against any one party as if they were jointly liable. In these states it becomes the responsibility of the defendants to sort out their respective proportions of liability and payment.

Also of note and key, it is understood under the current statute Colorado homeowners, with few exceptions, are not allowed to recover damages for defects that have not yet caused damages, even if it is expected they will cause damages in the future. That is, if a problem is discovered five years after construction, but the problem will not lead to damages for several more years, the period of repose will expire and damages will not be recoverable.

**Certificate of Merit Requirement**

Under *Colorado Revised Statute sections 13-20-602(3)(a)(I) and (II)*, it is understood if a licensed professional is a defendant in a legal proceeding then a certificate of merit is required. It must be executed by the plaintiff’s attorney and state, in pertinent part, that the lawyer has consulted a third-party expert “in the area of the alleged negligent conduct” and that the expert
has concluded, based on his review of the relevant facts and documents, that the plaintiff’s claim “does not lack substantial justification.”

Out of the twenty-nine (29) states surveyed, eight other states have certificate of review requirements prior to filing a claim. This ensures that a homeowner’s claim against a licensed professional is made with merit before beginning the process of litigation.

**Notice and Cure Requirement**

*Colorado Revised Statute section 13-20-803.5* has the following requirements.

- Before a construction defect action may proceed, the claimant must serve a written notice of claim to the construction professional he or she intends to sue.

- After the notice of claim is sent, the claimant must provide access to the affected property so that the alleged defect can be inspected by the target of the claim.

- The inspection must be completed within 30 days of service of the notice of claim.

- Within 30 days after the inspection (45 days if the property is commercial,) the target of the claim may send an offer to settle the claim to the claimant, either by payment or by agreeing to fix the defect.

Out of the twenty-nine (29) states surveyed, seventeen (17) states had similar statutes requiring notice and opportunity to cure. Colorado’s notice and cure requirement gives the builder an opportunity to review the homeowner’s claim, and determine whether they wish to repair, agree to some financial remuneration for the lack of repair (i.e., settle the matter out of court) or proceed with litigation.

**IX: The Demand for Condominiums in Peer Cities**

Peer city analysis is a common avenue to assess differences between cities. However, in order to be legitimate, the peer cities need to have reasonably similar demographic and industry characteristics. Even with similar characteristics, peer city analysis is a relatively rudimentary process.

EPS uses some objective data to identify the demographics when identifying peer cities/communities but seems to ignore the data when selecting San Francisco as a comparator to Denver. Pacey Economics believes, for the reasons described below, that the use of San Francisco as a peer city by EPS was inappropriate and led to incorrect and misleading conclusions.
As discussed in the market for housing and factors in the demand for housing section of this report, earnings whether measured as household income or per capital or median, etc., is a major determinant in the demand for a housing product (EPS used all three which all provide essentially the same information). Higher incomes, however measured, result in greater demand. Table 12 in the EPS report entitled Peer Cities Income and Wages, 2000 to 2010 notes all of the San Francisco wage and income measures to be approximately twenty five percent (25%) higher than Denver. This difference is substantial and, in and of itself, should eliminate San Francisco as a peer community.

The EPS report also considered housing density per square mile (housing units divided by land area within the relevant counties) as an important factor in the determination of peer cities yet the housing density in San Francisco was noted at 700du (dwelling units) per square mile while Denver is only 260du per square mile. Again, the difference is dramatic and a clear signal that San Francisco is not an appropriate or relevant peer community. (See page 26 of the EPS report.)

Another criteria considered in the EPS selection of peer cities that we believe should have been a signal to disqualify San Francisco as a peer community (but is likely less critical) is that the population in San Francisco and surroundings is 4.4 million while Denver Metro area population is under 2.5 million.

Not considered in criteria but Pacey Economics believes important in identifying peer communities, is the industry distribution as this reflects the earnings opportunities which is directly correlated to the demand for housing. Information identified in Figure 24 from the County Business Patterns finds San Francisco has 16% more of its job opportunities in the professional, finance, information services and management fields than Denver, which represent the higher end of the earnings spectrum.

Figure 24: Percent of Payroll that is Professional, Finance, Management, or Information, in 2012

![Chart showing percentage of payroll in professional, finance, management, or information fields in Denver and San Francisco in 2012.](source: County Business Patterns)
• Yet another criteria not considered in the EPS report, but clearly relevant for this analysis of the determination of appropriate peer communities is a recognition of land value. It is an important criteria as high land costs will predictably lead to a relatively greater rate of multifamily construction in order to spread these land costs across more units. Information from Lincoln Institute of Land Policy finds land costs in the San Francisco area are over six (6) times higher than in the Denver community.

Figure 25: Average Land Values Per Single Family Home in 2014 (Home Value Minus Structure Cost)

Source: Institute of Land Policy
X: CONCLUSIONS/FINDINGS

As noted throughout this report, Pacey Economics found critical flaws in the EPS study, not the least of which is that the most important EPS conclusions are based on subjective and biased data. It would not only be premature to modify existing statues through legislation, but likely inappropriate given the empirical data we have reviewed.

Given the available information, there is no assurance that even a small number of additional condominiums will be built due to a modification of construction defect statutes. In addition, there will be unintended ripple effects of such modifications that include:

- higher rates of defects in all construction (i.e., lower quality)
- homeowners will pay a larger share of the costs of the construction defects that do occur.

As has been extensively discussed in the report, the fundamental reason for the lack of condominium construction is the lack of condominium demand. However, economic activity is finally on the upswing in Colorado and across the nation. Some specific factors that reflect the resurgence in economic activity include:

- Residential real estate sales gained momentum in the past year as tight inventory (from the years of accumulated inventory post-2008) has begun to push prices up;
- Mortgage rates continue to remain at record lows;
- Consumer credit is beginning to ease as banks have returned to healthy standards and are pursuing market opportunities;
- Job creation in the Denver Metro market saw 42,000 net new jobs with continued forecasted growth of 8% in construction and resource management, 4.3% in professional services, and 3.5% in education and healthcare; (source: metrodenver.org)
- Unemployment rate in the Denver Metro area fell by nearly half--from a high of 9% in 2010 to 5.5% in 2014 (source: Bureau of Labor Statistics); and
- Employee compensation in Colorado increased by 6.1% in the prior year and wages per employee reached $51,425 (source: Quarterly Business and Economic Indicators – Third Quarter 2014);

It is anticipated that the improved economy will translate into increased demand for condominiums, higher condominium prices, and more condominium construction. Even though markets may not react as quickly as some would like, there is evidence that the market for
condominiums is starting a comeback. Just in the last year the following condominium projects have been announced in Denver:

- Brighton Boulevard Development – 100 condominiums;
- Brownstones at King Stroud Court – 26 three-story units;
- Rossonian Redevelopment – 35 to 40 condominiums;
- Boulevard One – 230 “rowhouses”;
- 2157 Downing Townhomes – 12 to 14 three-story townhomes; and
- 250 Columbine – 70 condominiums.

It is important to recognize that construction defects are not typically easily identifiable by a home buyer. For example, a new home owner is unlikely to know if the foundation was properly prepared until cracks appear in basement walls, or if the proper wiring was installed until a fire erupted. Such problems are not minor nor frivolous and are costly to repair, especially for the new homeowner or low income buyer with limited resources.

Product defects are not unusual and are an unavoidable element of every manufacturing industry, ranging from food products to automobiles to airlines to toy products, etc. The expenses associated with defects are a normal and expected part of doing business.

### XI: Avenues to Reach Goals of Metro Vision 2035

The key to encouraging condominium construction is not to shift the liability of construction defects from the builder to the buyer, but rather to strengthen demand and/or supply. Some ways this could be achieved are to:

- direct increase the demand for homeownership in urban areas through programs that create financial incentives for purchase (e.g., deferred down payments) and/or supply (e.g., rebates, deferred tax payments, etc.);
- indirectly increase the demand by attracting high quality industry and promoting amenities (e.g., parks) that encourage home ownership in urban areas;
- allow markets to work and provide incentives to convert existing apartments to condominiums;
- commence a review of the relevant insurance rates by the legislature; and
- reduce the risk associated with construction defects by developing a more effective construction warranty program where costs are shared by homeowners, builders and third-parties.
APPENDIX A: CITES AND SOURCES

- Annual financial reports for D.R. Horton, Meritage, Shea Homes, Lennar, and Richmond Homes
- Building Permits Survey (U.S. Census)
- Bureau of Economic Analysis (BEA)
- Bureau of Labor Statistics
- Colorado Department of Local Affairs, Division of Housing
- County Business Patterns (U.S. Census)
- College Insights
- Federal Financial Institutions Examination Council (FFIEC)– Home Mortgage Disclosure Act (HMDA) Data
- Federal Housing Finance Agency (FHFA) – Database on Single-Family and Multi-Family Properties, Monthly Interest Rate Survey (MIRS)
- Federal National Mortgage Association (Fannie Mae) – 10-Ks; Credit Supplements, Standard Eligibility Criteria
- Forclosure-Response.org
- Housing Vacancies and Homeownership (U.S. Census)
- Lincoln Institute of Land Policy
APPENDIX A: CITES AND SOURCES (CONTINUED)


- Mortgage Bankers Association

- National Association of Homebuilders

- Producer Price Index (Bureau of Labor Statistics)


- Survey of Market Absorption (U.S. Census)

- U.S. Department of Housing and Urban Development (HUD) – Mortgagee Letters, FHA Guidelines, Comprehensive Housing Market Analyses

- U.S. Federal Reserve
APPENDIX B: FIRM OVERVIEW AND AUTHOR BIOGRAPHIES

PROFILE OF PACEY ECONOMICS, INC.

Pacey Economics, Inc., located in Boulder, Colorado, has been an active member of the economic community for over 30 years. We have been involved in conducting analyses on an array of economic and business issues in both the private and public sectors. The firm is perhaps best known for its work in evaluating damages in a variety of legal matters (e.g., injury, employment, commercial) and we have also built a strong body of work and reputation with government agencies providing analyses relating to critical public policy decisions including impact studies, performance critiques, academic performance and funding analyses in secondary and higher education, etc. The firm also performs business valuations, development of business plans, and statistical and competitive market analyses for private and public companies and government agencies. The firm has been expanding and broadening its area of expertise to accommodate its own interests and skills as well as an increased demand for our services.

The firm was founded in 1983 by the president, Patricia L. Pacey, Ph.D., and has evolved to include professionals with substantial expertise in economics, business, and statistics. Mark S. McNulty, Ph.D. joined our staff in early 2008, and holds a joint Ph.D. in economics and statistics. The staff also includes two senior professionals, Jeff Nehls and Kimberly Owens. Other professionals affiliated with our firm provide additional expertise as needed on commercial, financial, accounting and/or tax issues. Amy Butler, Director of Operations, handles our support services.

Dr. Pacey was appointed by Governor Ritter to the Colorado Commission on Higher Education (CCHE) in 2007 and reappointed to a second term in 2011 by Governor Hickenlooper and now serves as the Vice Chair. The mission of CCHE is to implement directives of the General Assembly and direct, promote and preserve the quality, accountability, and efficiency of, and access to, Colorado public higher education. Previously, Dr. Pacey had served on the Treasurer’s Commission to Strengthen and Secure PERA, a commission to review PERA (Public Employees’ Retirement Association) procedures and practices. One of the recommendations from this Commission was to expand the Board to include outside professionals with specific expertise in finance and investment, among other recommendations regarding its operations. Since serving on this Commission, Dr. Pacey has been retained by Colorado PERA for various economic projects. Also, Dr. Pacey had been a long standing member of the Governor Revenue Estimator Advisor Council during both the Romer and Owen administrations. Recently, Dr. Pacey has joined the board of Rocky Mountain Public Broadcasting System (RMPBS).

Since joining the firm, Dr. McNulty was awarded a contract to conduct a biofuel econometric project for the National Renewable Energy Laboratory (NREL) which involved modeling dependency of biofuel production costs on energy prices and then developing a quantitative model embodying the key couplings between the biofuels industry and the traditional oil industry. Prior to Dr. McNulty joining the firm, he performed analyses related to national security as well as risk and decision analyses of laboratory operations at Los Alamos National Laboratory and then was involved in survey research and analysis with the University of Wyoming. Additionally, Dr. McNulty was the Director of Graduate Studies and associate professor, teaching Ph.D. theory sequences in statistics and economics and performing research with Kansas State University.

Since joining the firm, Drs. Pacey and McNulty have been the lead principals on The Economic & Fiscal Impacts of Colorado PERA, a report issued in August 2009, updated in November 2011 as well as a current update. Another major project was the study for the Colorado Department of Education which was entitled The Declining Enrollment Study: A Comprehensive Review of Funding for Colorado
Public School Education, issued in March 2010 and presented at the Legislative Hearings in April 2010. Through this study, Pacey Economics has become imminently familiar with the intricacies and nuances of Colorado school districts, student population and their demographics.

Dr. Pacey led numerous economic analyses and economic modeling projects for the State of Colorado. The first major project, completed in February 2001, involved an analysis of the impact of Amendment 23 to the Colorado Constitution, which created an education fund from a portion of tax revenues and mandated minimum spending levels the state legislature must provide for public education in Colorado. The end result of the project was the development of a comprehensive model that allows legislators to evaluate the impact of future funding and spending scenarios on the longevity of the fund. This project required Pacey personnel to work closely with members of various government departments including Legislative Council Staff, Colorado Department of Education, Colorado Department of Treasury, among other state agencies or organizations, and present their findings to the Legislative Audit Committee and the Joint Budget Committee. (This report is available under the Auditor's 2001 financial reports at www.state.co.us.) The second project included an analysis and review of revenue forecasting methods used for the Colorado Lottery, the development of an econometric forecasting model, as well as a review of the budgeting and grant process of Great Outdoors Colorado. Recommendations and responses by the parties were included in the final written report. This project also required presentations of findings before the Legislative Audit Committee. Additionally, the firm evaluated the fare-setting practices, economic efficiency and performance of the Regional Transportation District (RTD), a political subdivision of the State that provides a transportation network for an eight-county Denver metropolitan region. The firm’s findings were submitted in a written report and orally presented before the Legislative Audit Committee.

The firm has also conducted numerous economic performance audits of health care programs operated by the Colorado Department of Public Health and Environment, the Department of Health Care Policy and Financing, and for the Office of the State Auditor. Importantly, the firm was the contractor in the 2001, 2003 and 2005 Cost of Living Studies, completed for the Colorado Legislative Council. (However, due to internal constraints the firm did not bid on the 2007 and 2009 Cost of Living Study RFP.)

Pacey Economics continues to evaluate earnings losses and/or lost profits for individuals and businesses and, when needed, provide testimony on these matters. The projects range from comprehensive wage and pension analyses to addressing patent infringement and lost profit issues. These evaluations require a broad and ongoing accumulation of knowledge of the economic forces that drive prices, wages, labor force participation, employment rates, wage growth, consumer and medical price trends. The work also requires a thorough understanding of managerial economics and finance principles plus a solid macroeconomic foundation. More recently the firm has been retained by separate entities to provide 1) a comprehensive analysis of declining sales for a major grocery retailer, 2) the impact of defective packaging for a local food manufacturer and 3) statistical analyses relating to disparate treatment for the EEOC.

Other projects include a study of the taxicab market in the Denver area and the findings were presented to the Public Utilities Commission. The purpose of this project was to analyze the structure of the Denver metro taxicab market with respect to the legislative intent to create a regulated competitive environment. The firm reviewed the relevant historical data including population, income, tourism, and other macroeconomic statistics to demonstrate trends in the local market. To complete the analysis, we also reviewed specific data regarding the taxicab industry in the Denver metropolitan area available from the Public Utilities Commission, including ridership statistics, plus industry specific statistics such as company performance and financial data, drivers lease fees, etc. The results of this project were presented in a detailed written report as well as oral testimony presented to the Administrative Law Judge (ALJ) for the Public Utilities Commission. Other projects conducted by the firm over the past decade include the provision of economic loss analyses that were required for
hearings by the Special Master in charge of the Victims’ Compensation Fund, a fund set up by Congress to assist the victims of the September 11, 2001 terrorist attacks. We have also completed several analyses regarding the potential diminution of real estate values due to environmental contamination.

In the nineties, the firm produced several studies ranging from empirical analyses of the factors affecting sports participation, the economic impact on a university and community as a result of sponsoring sporting events (including multiplier effects), financial and statistical analyses of Division I athletic programs, player surveys, quantification of television ratings and the relation of such ratings to game characteristics, and implications of Title IX legislation. During the late 1980s and into the 1990s, the firm was involved in studies relating to legislative changes in the telecommunications industry and we were involved in several studies evaluation access and pricing in telecommunications.

All of our work requires an extensive knowledge of the literature and sources available for economic data and research. Many of these projects require the use of statistical and econometric modeling, while other projects utilized macroeconomic concepts such as multiplier effects, spending pattern matrices and descriptive statistics, etc.
PATRICIA L. PACEY, PH.D.

Dr. Pacey formed her economic and business consulting firm, now known as Pacey Economics, Inc., in the early 1980’s while she was teaching at the University of Colorado, Boulder. She is frequently called upon to assess economic issues in the litigation arena. In her litigation support she incorporates labor market data and other micro- and macroeconomic data to measure economic damages for claims relating to personal injury, wrongful death, and employment termination as well as for commercial and class action matters. She has wide and diverse experience testifying as an expert witness in state and federal courts and also before legislative bodies.

In addition to litigation work, the firm contracts with government agencies and corporations to conduct economic studies. Since 2000, Pacey Economics, Inc. has contracted with the Office of the State Auditor to develop the model measuring the impact of future educational funding and spending for K-12 education required by Amendment 23, replicated and critiqued the Colorado Lottery forecast model, provided an analysis of the economic performance of the Regional Transportation District (RTD), among other projects. Pacey Economics, Inc. was also awarded several contracts by the Colorado Legislative Council to conduct the Colorado School District Cost of Living Study and the Colorado Department of Education (CDE) awarded the firm a nearly year-long contract to conduct a comprehensive review of funding and student performance issues in our K-12 system. Dr. Pacey is retained by Colorado Public Employee Retirement Association (PERA) to conduct economic and fiscal impact studies, analyze the impacts/benefits of alternative pension plans as well as other economic related analyses for the organization. Over the past two decades she has regularly assisted the Boulder Municipal Employee’s Association (BMEA) in their wage and benefit contract negotiations.

Dr. Pacey graduated cum laude with a Bachelor of Arts in mathematics from the University of Florida and went on to receive her Ph.D. in economics, also with honors, from the same institution. Upon receiving her Ph.D., she became an analyst for the then nascent Congressional Budget Office (CBO) in Washington D.C., preparing cost estimates for proposed legislation related to education, human resources, and Social Security. She left government service to join the faculty of the University of Colorado where she taught a variety of undergraduate and graduate courses including antitrust, managerial and financial economics, microeconomics, statistics, and econometrics and published articles in The Southern Economic Journal, The Journal of Industrial Economics, Economic Inquiry, Journal of Business, and Telecommunications Policy.

Dr. Pacey currently serves as the Vice Chair of the Colorado Commission on Higher Education (CCHE), the coordinating agency that establishes higher education policy and funding, and recently joined the board of Rocky Mountain Public Broadcasting System (RMPBS). She has participated as a speaker/lecturer for continuing legal education programs, is a member of several economic organizations and of Beta Gamma Sigma, an honorary business fraternity, and is active in fulfilling other community service commitments.
MARK S. McNULTY, PH.D.

Dr. McNulty joined Pacey Economics, Inc. as a Senior Analyst in 2008 and specializes in economic loss evaluations and in providing expert witness testimony in personal injury, wrongful death, and employment termination cases. Dr. McNulty's broad and diverse career has also made him skilled at clarifying and defining real-world decision problems and in developing innovative economic and statistical solutions to those problems. He has expertise in a wide range of economic and statistical methodologies and has experience applying those methodologies to the solution of decision problems in an equally wide range of application areas. Complementing these problem-solving skills is a superior ability to communicate concepts and results.

Dr. McNulty began his career at Kansas State University where he taught the Ph.D. core courses in microeconomics and econometrics and was recognized as an outstanding instructor, produced numerous refereed publications, and was Director of Graduate Studies for the Department of Economics. After earning his tenure at Kansas State, Dr. McNulty joined CASA, a financial consulting company that perished in the dot-com crash. At CASA he performed financial analyses ranging from consumer scoring to macroeconomic forecasting for major corporations such as Citibank and Monsanto. Dr. McNulty then joined Los Alamos National Laboratory (LANL) where he worked in virtually every area of the laboratory. At LANL he performed analysis and research in support of core laboratory projects (e.g., nuclear weapons and homeland security) and laboratory operations (e.g., production, finance, organization, security, and safety) and was responsible for the management of projects and staff. Dr. McNulty's work at LANL emphasized the practical application of advanced economic and statistical tools to help senior management make informed decisions. He was frequently a technical team leader, directing required scientific work and interfacing with project sponsors. These sponsors were often the most senior management of the laboratory. Prior to joining Pacey Economics, Inc., Dr. McNulty was a senior Research Scientist at the University of Wyoming, where he performed policy analyses related to health, environment, education, and criminal justice; built and analyzed global energy models, and conducted survey methodology research.

Dr. McNulty holds a joint Ph.D. in economics and statistics from Iowa State University and a joint B.S. in economics and mathematics from the University of South Dakota. He has expertise in a wide range of economic methodologies including cost-benefit analysis, decision analysis, risk analysis, prioritization, and market analysis. He also has expertise in important statistical methodologies including econometrics, time-series analysis, reliability analysis, survey analysis, and information integration. He has applied these methodologies to the solution of decision problems in the areas of economic loss, program and policy evaluation, energy and the environment, financial and commodity markets, institutional operations and project management, national defense and homeland security, and conventional and nuclear weapons. Dr. McNulty is highly skilled at managing projects, interfacing with clients, and communicating results.
In 2003 Mr. Nehls started with Pacey Economics, Inc. as an intern during the summers while attending college. Upon graduating in spring 2007, and after a year working abroad, he became a full-time associate in 2009. Mr. Nehls provides analysis relating to litigation in personal injury, death, and employment separation/termination cases utilizing various labor economics data and research. He prepares written reports, charts, graphs, and other materials for expert witness presentation, and handles questions from both attorneys and clients. He is a key contributor on public policy projects for state and local agencies including the Colorado Department of Education (CDE), Boulder Municipal Employee Association (BMEA), and Public Employee Retirement Association (PERA). In this regard he develops materials, creates presentations for policy makers, and is especially adept at designing information to be readily understandable to policy makers.

Mr. Nehls also has experience developing databases, designing studies and reports, and conducting quantitative and qualitative research including extensive work with Bureau of Labor Statistics employment data and projections. He designed a STATA program to perform statistical analysis on large cross sectional and longitudinal data for a business competitor sales analysis. More recently, Mr. Nehls has begun co-authoring reports and will be offering deposition and trial testimony. His knowledge in applied economics, combined with strong computer skills, enhance his expertise for a variety of consulting projects. Mr. Nehls frequently attends the deposition and trial testimony of other experts at Pacey Economics, Inc. to solidify the skills and background to provide testimony of his own.

Mr. Nehls is a member of the National Association of Business Economists (NABE), National Association of Forensic Economists (NAFE), and the Denver Association of Business Economists (DABE) and has recently become eligible to obtain the Certified Business Economist (CBE) designation.

Mr. Nehls obtained a Bachelor’s degree in 2007 from University of Puget Sound, Tacoma, with a major in economics and minor in mathematics and anticipates completing his Master’s degree in economics from University of Colorado Denver in May 2015.
Ms. Owens joined Pacey Economics, Inc. in 2013 and specializes in economic loss evaluations and economic and policy analyses. Kimberly holds a M.A. in International Development from the University of Denver’s Josef Korbel School of International Studies and a B.A. in Economics from the University of Virginia.

Ms. Owens began her career in the financial industry, working for Pacific Alternative Asset Management Company where she performed investment and macroeconomic research, analyzed performance attributions, implemented due diligence procedures and ensured effective and efficient operational procedures. She later transferred to the London office where she used global research to identify portfolio opportunities. Her financial and analytical analyses included stress testing, scenario analysis, risk/reward and liquidity modeling.

Ms. Owens returned to school to attain her Master’s Degree in International Economic Development focusing on creating business plans and objectives to foster sustainable development. While at school, she continued to offer consulting services in the financial industry as a research analyst with Crestone Capital Advisors with an emphasis on the renewable energy/sustainable development sector. Upon graduation she joined Flatiron Capital, a division of Wells Fargo Bank, where she was an analytic consultant responsible for identifying inefficiencies in processes and assisting in loan supervision to assure compliance with portfolio risk and concentration limits. She was part of the risk and IT teams with duties that included portfolio analysis, data mining, streamlining databases, adherence to compliance regulations, and value-added reporting and analysis to facilitate strategic business decisions. She ensured that data results were consistent, reliable, and accurate through the creation and documentation of standards, policies, definitions, and procedures and through the completion of audits and quality control testing. She also developed meaningful metrics and made presentations to senior-level executives regarding strategic planning, volume forecasting and market penetration and sales evaluation.

Ms. Owens’ responsibilities with Pacey Economics, Inc. include providing economic loss analyses in litigation matters relating to personal injury, wrongful death and employment separation/termination relying on a broad wealth of micro- and macroeconomic foundation, particularly labor market data. Ms. Owens is developing her expertise as a testifying expert and is currently directly involved with attorneys and clients in authoring economic loss reports. She is a member of the National Association of Business Economists (NABE) and the Denver Association of Business Economists (DABE), and is working towards becoming qualified as a Certified Business Economist (CBE). Ms. Owens also provides integral research and is a key contributor on economic projects to public agencies concerning economic impact studies, cost-savings, etc.

For more information on the firm, the team and related projects, please visit our website www.paceyecon.com.
APPENDIX C: SUMMARY CHARTS
Step 1: Demand

The downward sloping line is the demand (D) for a housing unit. The demand line tells us how many units will be “demanded” at specific prices.

As an example, at $400K there is a demand to buy 100 housing units; while at $100K there are some 250 housing units to be purchased.

Step 2: Shift in Demand

Let us now assume the lending requirements are tightened such that instead of a 3% down payment being required it became (almost overnight) a 10% down payment required.

An increase in the required down payment (nothing else in the economy changing) will mean, most, if not all consumers will be able to purchase less, generally, across all levels of income and all prices.

This is illustrated in Step 2 where the original demand has now shifted down at every housing price – as demonstrated by D'.

Now there are only 50 consumers demanding a housing unit at $400K and only 175 at the $100K housing unit price.
Step 3: Supply

The upward sloping line is the supply of housing units (S) developers are willing to build at the specified prices they are willing to sell.

To construct a housing unit, the supplier incurs costs – costs of land, labor, materials, etc. as well as costs for interest on construction loans, insurance, etc. in addition to the profits that need to be included. All of these costs will impact how many housing units will be built and at what price; naturally the higher the costs, the higher the housing price.

In this example, at $100K a house there would be 50 housing units offered by suppliers while at $400K the number of housing units that would be built is 200.

Step 4: Shift in Supply

Now for similar reasons as discussed regarding demand, if the cost of materials (lumber, cement, labor, etc.) increases (again considering no other changes) it will affect the cost to build a housing unit and S' shows fewer units will be offered at the various prices.
Step 5: Supply and Demand

When integrating supply and demand on the same chart we find a lower quantity and lower price results from the aforementioned shifts in demand and supply.

Of course, there will be housing units sold at lower prices but fewer housing units will be built at the lower price than consumers would desire but it is because suppliers are not willing and/or are not able to offer more at the lower price. Conversely, suppliers would desire to build more high priced housing units but have no consumers to sell them to.
## Factors Affecting the Demand for Home Ownership

<table>
<thead>
<tr>
<th>Factor</th>
<th>Trend</th>
<th>Effect on Demand</th>
<th>Effect on Price</th>
<th>Effect on Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real Income</td>
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<td>Unemployment</td>
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<td>Personal Savings</td>
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<td>Student Debt</td>
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<td>Loan Requirements</td>
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<tr>
<td>Required Credit Scores</td>
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<tr>
<td>Fees/Insurance</td>
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<tr>
<td>Interest Rates</td>
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<tr>
<td>Marriage Rates</td>
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<td>Delayed Household Formation</td>
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<tr>
<td>Percent of the Population in Prime Age for First Time Home-Buying</td>
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<tr>
<td>Ethnicity (Percent of the Population that is a minority)</td>
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</table>
Factors Affecting the Supply of Housing

<table>
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<th>Effect on Price</th>
<th>Effect on Quantity</th>
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</thead>
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<td>Land Costs</td>
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<td>Labor</td>
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<tr>
<td>Producer Price Index (New Construction)</td>
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<tr>
<td>Lending Requirements</td>
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<tr>
<td>Interest Rates</td>
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<td>↑</td>
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<td>↑</td>
</tr>
<tr>
<td>Insurance Premiums/Construction Defect Legislation *</td>
<td>Increased insurance premiums, whether arising from construction defect litigation (litigation costs, costs to repair, costs to mitigate, i.e. third-party quality assurance, etc.) or other factors, will increase costs to the builders/developers. However, we have been unable to obtain reliable empirical data due to the highly guarded information from both builders and insurance companies. Therefore, the trends in these costs cannot be ascertained and cannot be analyzed until such information is forthcoming.</td>
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</table>

*We encourage builders/developers to submit information regarding insurance premiums, costs of litigation/lawsuits, etc. so a proper analysis of these factors may be performed. Further, a legislative oversight and review of insurance rates could allow appropriate insight into construction insurance rate trends.
Condominium Completions, Sales and Relative Prices

The number of permits issued for condominiums has decreased dramatically between 2006 and 2013.

The yellow dotted line shows that, even with less supply, there are a large number of available condominiums not being sold in the first six months after completion.

The decrease in Denver condominium permits parallels the entire western region’s experience (Western Region includes CO, NM, WY, MT, AZ, UT, ID, WA, OR, NV, CA and AK per US Census Bureau).

The market value of apartments relative to detached homes has grown steadily since 2006, creating a clear market incentive to build apartments. Further, our observations on historical condominium prices from various data sources (i.e., housing market data websites) indicates the growth in apartment values relative to condominium values has been even greater than to detached housing.

Home mortgage application data, an indicator of house purchasing activity, shows demand has fallen from nearly 10 million applications per year in 2005 to approximately 4 million applications in 2004.

Even with a decline in the number of applications, there was an increase in the percent of applications denied, further dampening the demand for housing.
Four Reasons for the Decline in Demand for Housing
(All Housing Products)

Real income have declined markedly since the early 2000s for all age groups, but especially for the younger age groups whom are more likely to be first time home buyers.

High unemployment rates in the Denver metropolitan area (as well as nationally), especially amongst the youth, have not yet returned to pre-recession levels.

The unemployment rate was a record low in 2000 (some 2.5%), and was still below 5.0% in 2008 but increased to a high of 9.0% in 2010 before gradually falling to the current unemployment rate of 5.5%.

Savings as a percent of disposable income fell to a bleak 3% in 2007 as people spent a significant portion of their money on goods and services, including housing.

These low savings rates relative to history reduces the ability to make down payments on mortgage loans as well as ongoing mortgage payments.

Average debt of Colorado four-year college graduates increased from approximately $15,000 in 2004 ($18,200 in 2012 dollars) to nearly $25,000 in 2012 (the most recent year of available data), over a one-third increase in real dollars.
Home Purchaser Buyer Profile  
(Typical First Time Buyers)

**Likelihood of a 26-30 Year Old Owning a Home by Marital Status**

Married individuals ages 26 to 30 are more than twice as likely to purchase a home.

**Likelihood of a 26-30 year old Being Married**

However, the likelihood of 26-30 year olds being married has declined 39% since 1980 and 23% since 2005, lowering the demand for housing.

**Urban 26-30 Year Old Living at their Parent’s Home**

Plus, lower real incomes, higher debt obligations, and lower marriage rates all support individuals delaying forming a household of their own or remaining at home with their parents for longer periods.

Naturally, this phenomenon will serve to decrease the demand for home ownership.

**Percent of Urban Colorado Population in Their Twenties (20-29)**

Plus, the urban Colorado population that is in their twenties was 20% of the overall population in the 1970s, but has steadily decreased to less than 15% of the population (over a 30% decrease) in 2014.

Individuals in their twenties and early thirties are the most likely to be first-time home-buyers.
Increased Barriers/Costs to Buyers

If a buyer could have purchased a $200,000 home with a 3% down payment, but now must put 10% down, this will result in additional closing costs of $14,000.

Increasing fees and costs associated with obtaining a mortgage has made homeownership less affordable as well.

Initial fees and charges for conventional loans have increased from 0.45% in 2005 to 1.30% (nearly three-fold) in 2014.

Although seemingly small on a $200,000 mortgage, this increase will amount to another $1,700 in upfront costs.

Annual mortgage insurance premiums have also increased substantially.

Not only did the annual charge change from a low of 0.50% circa 2008, to current annual rates of 1.30% (more than double), but also the time required to pay the mortgage insurance premium was dramatically increased resulting in further long-term costs to the buyer.

Lenders are now requiring higher credit scores to be eligible for a loan.

The higher credit scores inherently remove a subset of the population that would even be willing to buy a home but due to higher credit standing are now not able to meet the requirements.
A major factor driving the cost (and thus supply) of housing is construction labor costs. Despite the Great Recession, payroll data indicates the average pay of an employee in the construction industry steadily increased from 2005 to 2012.

Denver construction labor costs increased substantially more (15 to 20%) than the national average for this class of worker.

A more all-encompassing measure of overall new construction costs comes from the Producer Price Index (PPI) published by the Bureau of Labor Statistics.

This index includes all of the costs of building weighted by their respective usage, as reported by construction establishments. These costs include labor, materials, etc.

The Producer Price Index shows that the costs of new construction increased by approximately 30% from 2000 to 2013 putting downward pressure on the overall supply of housing.

No reliable information publicly available.