

# Housing Wealth and Angel Investing: Empirical Evidence from British Columbia

by

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A Thesis Submitted in Partial Fulfillment of the Requirements for the  
Degree of Bachelor of Sciences, Honours  
in the Department of Economics  
University of Victoria  
April 2016

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## **Abstract**

This paper empirically examines the effect of real estate price growth on the portfolio choices of angel investors. Using data obtained from all British Columbian government supported angel investments between 1995 and 2009 this paper estimates the effect of local house price changes on the propensity and magnitude of angel investment. The empirical results indicate that local house price growth has a positive impact on the amount of regional per capita angel investment. Conversely, within-year house price volatility decreases the amount of angel investment. The use of housing as collateral and decreasing investor risk aversion are hypothesized to be the two primary channels through which real estate influences angel investment.

### **Special Thanks:**

Investment Capital Branch of the B.C. Provincial Government

Dr. Dan Vo

Dr. Thomas Hellmann

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## 1. Introduction

This paper examines the relationship between housing wealth and “angel” investments. In particular, I attempt to answer the following question: Do changes in local real estate prices affect the propensity and magnitude of angel capital investment? I concentrate on real estate wealth as a determinant of investment because it represents a substantial proportion of total wealth for many individuals and there has been very little research on how it affects the provision of capital to entrepreneurs. Angel investments will be defined using the following criteria: the provision of capital by an individual or group of individuals to a privately owned business that is not operated by a family member. The ability to answer this research question is provided by a unique data set of British Columbian angel investors. This dataset tracks every eligible domestic angel investment made between 1995 and 2009. Thus, in this paper I am able to estimate how regional housing prices affect the propensity and magnitude of angel investment in British Columbian startups.

Household investment in real estate represents a significant component of total wealth in British Columbia. The most recent Survey of Financial Security highlighted the fact that in 2012 primary residences and investment properties comprised 53.2% of total British Columbian household wealth (Statistics Canada, 2014). The relative proportion of wealth held in real estate tends to fall as income rises but still represents 40% of total assets for the top quintile of the Canadian income distribution (Uppal & LaRochelle-Cote, 2015). Any discussion of investor behaviour needs to acknowledge the effect changes in real estate prices can have on the size and riskiness of investor portfolios.

This paper examines the quantity and magnitude of domestic angel investment and how it responds to changes in regional house prices. The effect of annual housing price growth and within year price volatility are the two main variables of interest. I implicitly assume that all the angel investors in our sample are homeowners. Any additional properties in their possession and the overall composition of their financial portfolios are unobservable. The analysis is confined to investors who provide capital to at least two different companies to avoid transactions between friends or family members. Individual-level investor data is aggregated to the regional level to allow comparisons to be made between local home prices and regional investment activity. As far as I can tell, no published studies in the existing literature have looked at this question.

Kerr et al. (2015) was the first paper to study the effect of housing wealth on entrepreneurial activity. Their analysis of entrepreneurial finance in the United States focused on the demand for startup capital by entrepreneurs between 2000 and 2004. The authors hypothesize that higher levels of housing wealth allow entrepreneurs to acquire bank loans that utilize their home as collateral. The analysis conducted by Kerr et al. (2015) provides evidence of a link between entrepreneurship and home equity financing that is modest but statistically significant. However, the authors argue that home equity financing may be increasing entrepreneurial activity by lowering the barriers to entry rather than displacing existing demand for alternative sources of capital. The model specification utilized by Kerr et al. (2015) forms the basis of the empirical strategy implemented by this paper.

The central contribution of this paper is that it furthers our understanding of investor behaviour when faced with changes in home equity. Home prices have received considerable media attention in British Columbia because of strong growth in the value of real estate assets during the last twenty years. Participating in the angel market requires having disposable income but it is not an activity that is exclusive to high net worth individuals (Shane, 2009); it is not unreasonable to expect that prospective angel investors will be affected by changes in the value of their real estate holdings. I hypothesize that changes in the value of local real estate will affect angel supply through four counteracting forces: the collateral effect, decreasing risk aversion, elevated background risk, and the crowding out effect.

The collateral effect arises because investors can borrow against the value of their real estate assets to increase the size of their investments. We would expect to see larger angel investments when house prices increase if the collateral effect dominates. Another potential driver of angel investment is decreasing risk aversion. Guiso and Paeilla (2008) present empirical evidence that risk aversion is a decreasing function of endowment; higher levels of wealth should correspond to a higher tolerance for risky investments such as the provision of angel capital. Conversely, because housing is an illiquid asset it may actually increase risk aversion as it becomes a larger proportion of total wealth. Kullmann & Siegel (2005) demonstrated evidence in favour of this background risk effect by finding that stock market participation is inversely related to real estate exposure. The final channel through which I hypothesize real estate will affect angel investing is the crowding out effect. Chakraborty et al. (2013) highlighted the fact that banks decrease commercial lending and raise interest rates on commercial loans when local

home prices increase. Banks reallocate capital from commercial to real estate investment when the demand for mortgage debt is high. The provision of angel capital provides intrinsic value to the angel beyond the expected return on capital so it may not be realistic to treat angel and real estate investment as being substitutes. Nevertheless, strong real estate price growth represents an enticing investment opportunity for individuals looking to generate a return on available capital.

Assessing the magnitude of each of these effects is not possible with the data available. By observing the overall level of investment activity we can determine whether housing price growth increases or decreases angel investment. However, assessing what combination of effects is driving a change in angel investment is not currently feasible. One issue that could bias the obtained results is the endogeneity problem: there might exist factors that influence both house prices and investment opportunities that are not included as explanatory variables. To address this problem Chaney et al. (2012) instrumented real estate prices using the interaction between interest rates and local housing supply elasticity. I was only able to obtain local housing supply elasticity data for municipalities in the Greater Vancouver area (Drysdale, 2012). However, the endogeneity test implemented by STATA fails to reject the null hypothesis that house price growth can be treated as exogenous. Without access to better housing supply elasticity data it is not possible to properly instrument house price growth.

This paper finds evidence to suggest that residential home price growth is correlated with higher levels of real per capita angel investment. Within-year house price volatility is correlated with lower levels of investment. Assessing the impact of regional house prices on investment

flowing into a region yields no statistically significant results. This would suggest that the effect of price growth is confined to the supply of angel capital and has no impact on demand.

Section 2 of this paper covers the existing literature that is of relevance to this paper. Section 3 provides an overview of the data being utilized in my analysis and highlights several descriptive statistics. Section 4 details the empirical strategy. Section 5 presents the results and discusses their implications. Section 6 concludes.

## **2. Literature**

Chaney et al. (2012) examines investment decisions at the firm level and how their behaviour changes in response to changes in local real estate prices. Their empirical results indicate that firms utilize the value of their real estate assets as collateral to increase corporate investment in response to rising real estate prices. Chaney et al. (2012) find that after holding other factors constant, a \$1 increase in the market value of pledgeable assets increases corporate investment by \$0.06. Evidence in favour of an increase in angel investment after real estate prices rise could point to a similar wealth effect occurring amongst prospective angel investors.

The notion that absolute risk aversion is a decreasing function of wealth was first proposed by the economist Kenneth Arrow (Guiso & Paiella, 2008). Holding all else equal, wealthier individuals should have a higher tolerance for risky assets in their financial portfolio. Guiso and Paiella (2008) provides empirical evidence from household survey data in favour of this hypothesis. Given that strong real estate price growth injects a significant amount of wealth



into the hands of local homeowners, decreasing levels of risk aversion will result in a higher tolerance for risky assets such as angel capital. The large increase in British Columbian house prices between 2001 and 2008 provides a suitable sample for testing the presence of this effect.

Alternatively, Kullmann & Siegel (2005) demonstrates that exposure to real estate as a percentage of net worth is negatively correlated with participation in the stock market. Using panel data on the financial portfolios of American individuals between 1984 and 2001 this paper estimates the effect of real estate background risk on the proportion of wealth held in the stock market. Holding all else equal, having a higher exposure to real estate decreases the likelihood an investor will participate in the stock market. Conditional on participation, investors with more real estate exposure invest less wealth in risky assets. This paper also found that higher levels of house price volatility significantly reduce the likelihood of stock market participation. These conclusions are relevant to any discussion of investor behaviour and risky investments. While the provision of angel capital and investing in the stock market are not perfect substitutes they can both be broadly defined as risky assets.

Chen et al. (2015) draws from the work done in Chaney et al. (2012) to examine the behaviour of Chinese firms in response to real estate shocks. Their research indicates that firms increase commercial land investment when real estate prices increase if they are existing land owners. However, firms that do not own land see an overall decrease in corporate investment when real estate prices rise, indicating a crowding out effect. Their results point to real estate crowding out competing forms of investment and a misallocation of resources. Despite the

non-pecuniary benefits associated with angel investing it is still a source of capital that must compete with alternative forms of investment. Evidence in favour of the crowding out effect would indicate that angel investment decreases in regions where local housing markets experience strong price growth.

### **3. Data**

#### *3.1 Data Description*

The primary source of data for this paper comes from the Venture Capital Tax Incentive Program (VCP) administered by the Government of British Columbia. Angel investors and venture capital firms are entitled to a 30% refundable tax credit when they provide capital to an eligible business located within the province (Ministry of International Trade, 2015). The VCP classifies investment under two distinct models: Venture Capital Corporations (VCC) and Eligible Business Corporations (EBC). The EBC model was created in 2003 to facilitate direct investment in domestic start-ups. The EBC route allows individual investors to easily make angel investments without going through the time intensive process of setting up a VCC. A VCC is a corporation created for the express purpose of investing in start up businesses. Retail VCCs are professionally managed companies that invest capital on behalf of high net worth individuals. Retail VCCs are typically known to the general public as venture capital firms. However, not all VCCs are professionally managed. Non-retail VCCs are organizations wherein accredited investors pool their capital and collectively make investment decisions. Non-retail VCCs are alternatively known as angel funds. This paper will exclusively focus on non-retail VCCs.

The data being used in this paper covers every angel capital transaction between 1995 and 2009 that was reported to the B.C. government. Each transaction is linked to a unique investor ID, thereby ensuring that changes in investor behaviour can be tracked across time. Regional house price data was incorporated using investor postal code data by Dr. Dan Vo. Using this initial file, I was then able to aggregate individual level estimation to obtain regional annual investment data. Historical house price data from the Multiple Listing Service (Canadian Real Estate Association, 2016) and BC Assessment<sup>1</sup> connects regional angel investment to the average price of a residential property in that region. Census profiles for the years 2001 and 2006 have been incorporated into the data (Statistics Canada, 2001; 2006). The Consumer Price Index is used to express any financial variables in real terms (Statistics Canada, 2016). Historical market capitalization data for the TSX and TSX Venture were obtained from the TMX Group Historical Data Access (TMX Group, 2016). Prime lending rate data was obtained from the Bank of Canada (Bank of Canada, 2016). Finally, municipal population data was obtained from BC Stats (BC Stats, 2016).

There are several sample selection issues that need to be identified. The provincial government sets an upper limit on the amount of refundable tax credits that can be claimed in any given year. The upper limit presents a problem for our analysis because it distorts the amount of angel investment that would optimally take place. Another potential problem is the restriction that angel investors must have funded at least two different start ups between 1995 and 2009. New angels who make their first investment towards the end of the sample period are

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<sup>1</sup> BC Assessment data was supplied to the UBC Centre for Urban Economics and Real Estate.

problematic because they are more likely to be excluded from the analysis. These new angels may have invested in additional companies after 2009, but without access to that data they may be misclassified.

### *3.2 Descriptive Statistics*

Figure #1 denotes total real angel investment by British Columbian region. The five districts that comprise the Greater Vancouver Area (GVRD) collectively account for nearly three quarters of total investment. The only other region in B.C. that generates a significant amount of investment is the Greater Victoria area (CRD). Because many of the regions display levels of investment that are too low to capture how investors respond to local real estate prices, this paper will exclusively focus on major metropolitan areas in the province. The GVRD, CRD, Kamloops, and Okanagan-Mainline (Kelowna) are included in the regression model because comprehensive data is available for every explanatory variable. Table #1 highlights the fact that these four regions account for 89% of all angel capital transactions between 1995 and 2008. Unless otherwise noted any discussion of investment at an aggregate level will refer to investment originating from these four metropolitan regions.

Figure #2 graphs total real angel investment by year. There is a clear upward trend in investment despite considerable variation between years. Figure #3 denotes the average angel investment size by year. At first glance, Figure #3 would appear to contradict the gradual upward trend visible in Figure #2 because the average angel investment has grown considerably between 1995 and 2008. The number of angel transactions and unique investors utilizing the VCP has

declined dramatically during this time period (see Figure #4 and #5). This trend in the data defies easy explanation.

#### 4. Empirical Strategy

The model specification utilized by Kerr et al. (2015) forms the basis of this paper's empirical strategy:

$$INV_{r,t} = \alpha + \beta \ln(HP_{r,t} / HP_{r,t-1}) + \gamma X_{r,t} + \theta_r + \phi_t + \varepsilon_{r,t}$$

where  $INV_{r,t}$  is a magnitude or quantity measure of regional angel investment. Statistical estimates are run using total, local, and external regional angel investment to capture investment magnitude. Number of angel investments, unique investors, and initial participants are used as quantity measures. Every measure of angel investment is weighted by the regional population at year  $t$ .  $HP_{r,t}$  is the average residential home price in region  $r$  at year  $t$ . The  $\beta$  coefficient measures the marginal effect of year over year house price changes on the dependent variable. Changes are measured using the log difference of average home prices to capture the percentage increase in real estate value.  $X_{r,t}$  denotes any additional explanatory variable(s) that are included in the regression. Median absolute deviation (*mdev*) and standard deviation (*sd*) are used to measure within year housing market volatility. Within year housing market volatility is calculated by looking at quarterly changes in the value of local real estate. Two volatility measures are used because standard deviation is not robust to the presence of outliers whereas median absolute deviation is. The prime lending rate is used to approximate the interest rate faced by prospective investors. The yr/yr change in the value of the TSX is used to proxy the stock market return. The yr/yr change in the TSX Venture is included because it proxies the initial public offering (IPO)

climate for small start ups. I also include the annual number of business incorporations by region to assess how many new local firms are being created. Finally,  $\theta_r$  and  $\phi_t$  are fixed effect region and time dummy variables. Initial estimates capture the marginal effect of each explanatory variable on the dependent variable. Subsequent equations include the log difference of regional house prices as well as additional explanatory variables to capture their joint effect. It is important to note that this model is explicitly testing the supply side effect of house price increases, any effect on angel capital demand cannot be discerned. Section 5.3 details an extension of the basic model that tests the presence of a demand side effect.

This model utilizes a linear-log form. We are thus able to interpret the coefficients as follows: holding all else equal, a 1% increase in the explanatory variable increases the dependent variable by (Coefficient Estimate)/100. We would expect to see positive coefficient values for log house price growth if the collateral channel and/or decreasing risk aversion effect are dominant. We would expect to see a negative coefficient if the housing price background risk and/or crowding out effect are dominant. We would expect to see a negative coefficient for within year volatility if the collateral channel and/or decreasing risk aversion effect are dominant. The expected sign of the coefficient if the housing price background risk and/or crowding out effect are dominant would likely also be negative.

## **5. Results**

The first section of this analysis deals with investors present in four major metropolitan areas: the GVRD, CRD, Kamloops, and Kelowna. I also restrict my sample to investors who

have invested in at least two firms between 1995 and 2009. Because municipal population data only extends as far back as 2001 the analysis covers transactions made between 2001 and 2008. Table #3 highlights the fact that log house price growth, housing volatility, and business incorporations are all statistically significant predictors of real angel investment per capita. Eq. (1) and (2) indicate that these effects remain significant when all three explanatory variables are included in the regression. The coefficient on log house price growth can be interpreted as follows: holding all else equal, a 1% increase in the annual gross return on housing ( $HP_{r,t} / HP_{r,t-1}$ ) corresponds to a \$0.14 increase in angel investment per capita. Given that the mean level of regional angel investment is \$3.51 per capita (see Table #2), this translates to a 4% increase in investment activity. However, log house price growth and within year house price volatility ( $mdev$  and  $sd$ ) have coefficients with different signs. Log house price growth is associated with higher levels of angel investment per capita. Conversely, within year house price volatility is associated with less investment. Finally, regions with more business incorporations are more likely to have higher levels of angel investment.

At first glance, the estimated coefficients for log house price growth and within year price volatility appear to be contradictory. Year over year changes in the value of local real estate is correlated with higher levels of angel investment per capita; within year house price volatility has the opposite effect. However, the intuition behind this difference becomes more clear upon further examination. A positive coefficient indicates evidence in favour of the collateral channel and/or decreasing risk aversion being responsible for an increase in angel investment as real estate increases in value. The volatility measures indicate that the way in which residential home

prices increase matters as well. Two regions can have very similar price growth but with distinctly different growth patterns. For example, house prices in region A grow slowly but consistently every quarter. On the other hand, house prices in region B jump erratically with no predictable pattern. Our intuition would tell us that risk aversion will likely decrease in region A: there has been a stable increase in the wealth of residents living there. Conversely, the unpredictable nature of real estate prices in region B may actually increase risk aversion, given that wealth constantly fluctuates. Using the coefficient estimates obtained from our model, a 1% increase in  $HP_{r,t} / HP_{r,t-1}$  and a 0.5% increase in volatility (mdev or sd) produce effects that are roughly equivalent in magnitude but of opposite sign.

Tables #4 and #5 break down angel investment into local and external components. Local investments are angel transactions between angels and businesses that are located in the same region. A 1% increase in the annual gross return on housing corresponds to a \$0.115 increase in local angel investment per capita. The mean level of local angel investment is \$2.18 per capita (see Table #2), this translates to a 5.3% increase in investment activity. These results indicate that the positive relationship between log house price growth and angel investing is mostly being driven by higher levels of local investment. The effect on external investment is statistically insignificant for all explanatory variables apart from local business incorporations. Holding all else constant, higher levels of local business incorporations has a much stronger influence on the level of local versus external investment.



Tables #6, #7, #8 examine the quantity measures of angel investment. Log house price growth is not a significant predictor of the number of investments, unique investors, or new investors. The housing price volatility measures are valid at either the 1% or 5% level of significance and all have negative coefficients. Finally, Table #9 highlights the inclusion of census data as explanatory variables. Real income and the local unemployment rate do not have any discernable impact on angel investment per capita. Including educational attainment as an independent variable indicates that having a higher percentage of the population with undergraduate or Ph.D degrees does not correlate with higher levels of angel investment. However, regions with more Master's degrees per capita do appear to have higher levels of investment. I caution against making any conclusions from the Census data because there are only two time periods (2001, 2006) and sixteen observations.

## *5.2 Greater Vancouver*

Table #11 presents the analysis of angel investment in the Greater Vancouver (GVRD) area. Angels located in the GVRD account for the majority of investment in the province and the heterogeneity of house prices within the region allows us to reasonably approximate differences in investor wealth. Eq. (3) and (4) indicate that log house price growth has a much stronger effect on angel investment in the GVRD. A 1% increase in the annual gross return on housing corresponds to a \$0.32 increase in local angel investment per capita. The mean level of angel investment in the GVRD is \$4.97 per capita (see Table #10), this translates to a 6.4% increase in investment activity. The effect of house price volatility is relatively close to those observed in Eq. (1) and (2).

Table #12 and #13 present the breakdown of local and external angel investment in the GVRD. In line with the previous results, the effect of log house price growth is stronger for local angel investments. A 1% increase in the annual gross return on housing corresponds to a \$0.21 increase in local angel investment per capita in the GVRD. The mean level of local angel investment is \$3.43 per capita (see Table #10), this translates to a 6.1% increase in investment activity. However, the volatility measures are no longer statistically significant predictors of local or external angel investment.

### *5.3 Demand vs. Supply Effect*

The empirical results listed above provide evidence in favour of the collateral channel and/or decreasing risk aversion having an effect on domestic angel investors. However, it is difficult to disentangle the supply and demand side effects that may be occurring simultaneously. Both the collateral channel and decreasing risk aversion could be relevant for prospective entrepreneurs as well. Given that starting a small business involves a significant amount of risk, it is reasonable to expect decreasing risk aversion to have an effect on entrepreneurs as well as their housing wealth increases. Kerr et al. (2015) provides evidence indicating that house price growth increases the number of entrepreneurs who self-finance their businesses by borrowing against the value of their home. However, the entrepreneur's collateral channel may create more angel investments as well. Angel investors are more willing to supply capital to entrepreneurs who have invested a portion of their own wealth in the firm (Shane, 2009). If these effects do apply to entrepreneurs as well we would expect changes in regional house prices to affect the number of angel investments being made in companies located in that region. Table #13 highlights the estimates I utilized to test this hypothesis. None of the estimates have statistically

significant coefficients, indicating that house price growth and within year volatility have no impact on the number of angel investments flowing into that region. These results provide evidence suggesting that the collateral and risk aversion effects are not simultaneously affecting angel capital demand and supply. The collateral channel and risk aversion effects appear to only be influencing investor behaviour, providing evidence in favour of an angel supply side effect.

## **6. Conclusion**

The empirical estimates produced in this paper indicate that local housing price growth has a positive impact on real total angel investment (per capita). Conversely, within-year house price volatility decreases angel investment. Given that house price growth cannot exist without within-year volatility (but the reverse is not necessarily true), the overall effect depends on the size of house price increases and the level of volatility. For example, a 1% increase in the gross return on housing and a 0.5% increase in within-year volatility will have effects that are approximately equal in size but of opposite magnitude. These effects are predominantly occurring at the local level; the impact on external angel investment is relatively minimal. The two channels through which I believe real estate affects angel investment are the collateral channel and decreasing risk aversion. Section 5.3 details evidence indicating that these effects are confined to the supply of angel capital and have no discernible impact on demand.

There are several critical limitations to this study that need to be noted. The lack of data on individual investor real estate holdings and financial wealth limit the explanatory power of the empirical model. The assumption that angel investors are homeowners is likely a reasonable one,

but any additional properties they possess in other regions and the degree to which their real estate wealth moves in accordance with regional averages is unclear. Another potential concern is the fact that no significant downward real estate shocks are observed within the sample. Every regional housing market is characterized by an initial period of relative stability followed by large increases in the value of residential homes. A downward shock would have allowed us to observe how resilient angel investing is to fluctuations in the wealth of angel investors. Future research on angel investing could also examine the relationship between net worth and angel investing at an individual level. This evidently necessitates the existence of comprehensive longitudinal data on angel investor wealth and investment decisions.

## Bibliography

Bank of Canada. *Canadian Interest Rates and Monetary Policy Variables*. Ottawa, Ont: Bank of Canada. Retrieved on April 25th, 2016 from:

<http://www.bankofcanada.ca/rates/interest-rates/canadian-interest-rates/>

BC Stats. *Total Population - Municipalities, Regional Districts, and Development Regions*.

Victoria, B.C: BC Stats. Retrieved on April 25th, 2016 from:

<http://www.bcstats.gov.bc.ca/StatisticsBySubject/Demography/PopulationEstimates.aspx>

Canadian Real Estate Association. *MLS Home Price Index*. Retrieved on April 25th, 2016 from:

<http://www.crea.ca/housing-market-stats/mls-home-price-index/>

Chakraborty, I., Goldstein, I., MacKinlay, A. (2013). *The Dark Side of Housing Price Appreciation*. Vox. Retrieved from:

<http://www.voxeu.org/article/dark-side-housing-price-appreciation>

Chaney, T., Sraer, D., Thesmar, D. (2012). *The Collateral Channel: How Real Estate Shocks Affect Corporate Investment*. The American Economic Review, 102(6), 2381-2409.

Chen, T., Liu, L. X., Zhou, L-A. (2015). *The Crowding-Out Effect of Real Estate Shocks: Evidence from China* (Working Paper). Retrieved from Social Science Research Network

website: [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2584302](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2584302)

Drysdale, E. (2012). *Housing Supply Elasticities within the Lower Mainland from 1998 to 2012*.

Unpublished paper, Department of Economics, Simon Fraser University, Vancouver, Canada.

Retrieved from:

[https://www.sfu.ca/content/sfu/economics/undergraduate/undergraduate-awards/\\_jcr\\_content/main\\_content/download\\_1/file.res/Erik%20Drysdale.pdf](https://www.sfu.ca/content/sfu/economics/undergraduate/undergraduate-awards/_jcr_content/main_content/download_1/file.res/Erik%20Drysdale.pdf)

Guiso, L., Paiella, M. (2008). *Risk Aversion, Wealth, and Background Risk*. Journal of the European Economic Association, 6(6), 1109-1150.

Kerr, S., Kerr, W. R., Nanda, R. (2015). *House Money and Entrepreneurship* (Working Paper No. 21458). Retrieved from National Bureau of Economic Research website:

<http://www.nber.org/papers/w21458>

Kullmann, C., Siegel, S. (2005). *Real Estate and its Role in Household Portfolio Choice* (Sauder School of Business Working Paper). Retrieved from Social Science Research Network website:

[http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=424322](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=424322)

Ministry of International Trade. *Venture Capital Program Budgets*. Victoria, B.C: Ministry of International Trade. Retrieved on April 25th, 2016 from:

<http://www.mit.gov.bc.ca/ICP/VCP/BudgetDescriptions.htm>

Shane, S. A. (2009). *Fool's Gold? The Truth Behind Angel Investing in America*. New York: Oxford University Press.

Statistics Canada. *Consumer Price Index, Historical Summary (1996 to 2015)*. Ottawa, Ont:

Statistics Canada [Catalogue #62-001-X, 62-010-X and 62-557-X]. Retrieved on April 25th, 2016 from: <http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/econ46a-eng.htm>

Statistics Canada. *2001 Census of Population*. Ottawa, Ont: Statistics Canada. Retrieved on April 25th, 2016 from: <http://www12.statcan.ca/english/census01/home/index.cfm>

Statistics Canada. *2006 Census of Population*. Ottawa, Ont: Statistics Canada. Retrieved on April 25th, 2016 from: <http://www12.statcan.ca/census-recensement/2006/index-eng.cfm>

Statistics Canada. *Survey of Financial Security (SFS), composition of assets (including Employer Pension Plans valued on a termination basis) and debts held by all family units, by age group, Canada and provinces* Ottawa, Ont: Statistics Canada [CANSIM table 205-0002]. Retrieved on April 25th, 2016 from: <http://www.statcan.gc.ca/daily-quotidien/140225/dq140225b-eng.htm>

TMX Group. *Historical Data Access*. Retrieved on April 25th, 2016 from:

[http://apps.tmx.com/en/listings/products\\_services/ir\\_data\\_solution/historical\\_data\\_access.html](http://apps.tmx.com/en/listings/products_services/ir_data_solution/historical_data_access.html)

Uppal, S., LaRochelle-Cote, S. (2015). *Changes in Wealth Across the Income Distribution , 1999 to 2012*. Ottawa, Ont: Statistics Canada. Labour Statistics Division. Retrieved from:

<http://www.statcan.gc.ca/pub/75-006-x/2015001/article/14194-eng.htm>

Vo, D. (2013). *The Geography of Angel Investment*. Unpublished paper, Department of Economics, University of Victoria, Victoria, Canada. Retrieved from:

<https://nacocanada.com/wp-content/uploads/2013/12/Geography-of-Angel-Investment-20131112.pdf>

## Figures

Figure #1: Total (Inflation Adjusted) Angel Investment by Region (1995-2008)

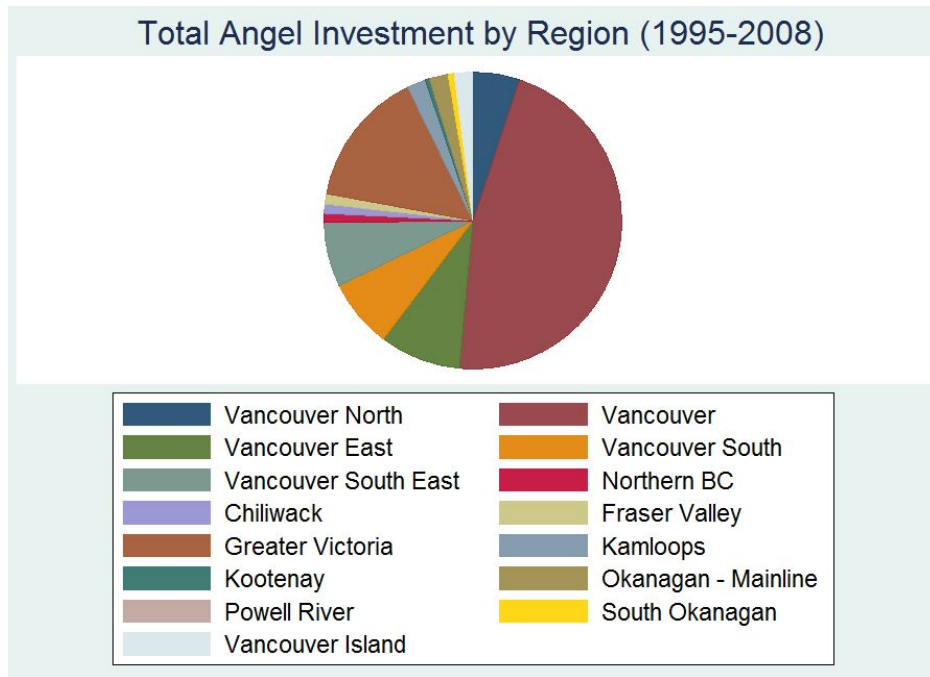


Figure #2: Total (Inflation Adjusted) Angel Investment by Year

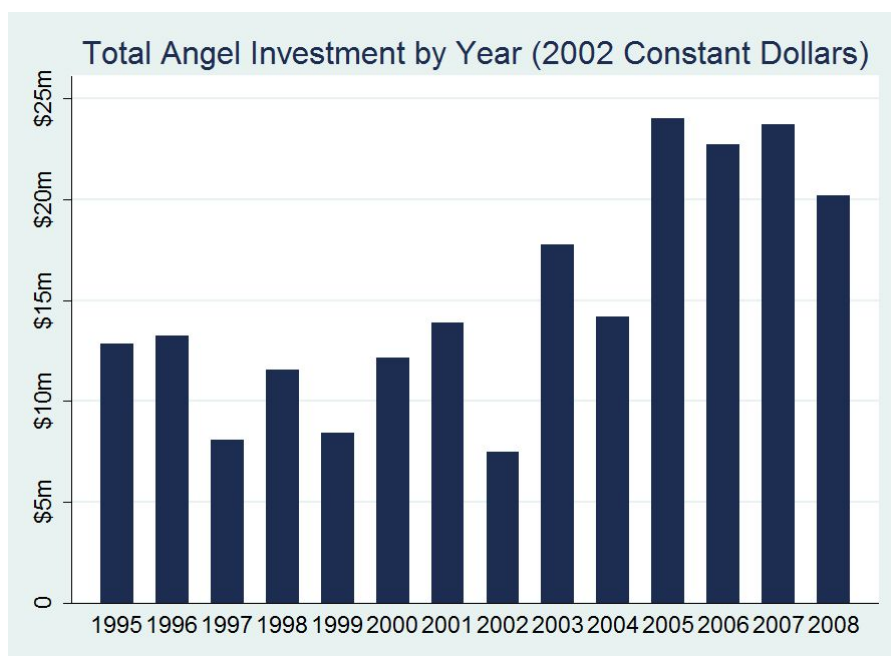




Figure #3: Average (Inflation Adjusted) Angel Investment by Year

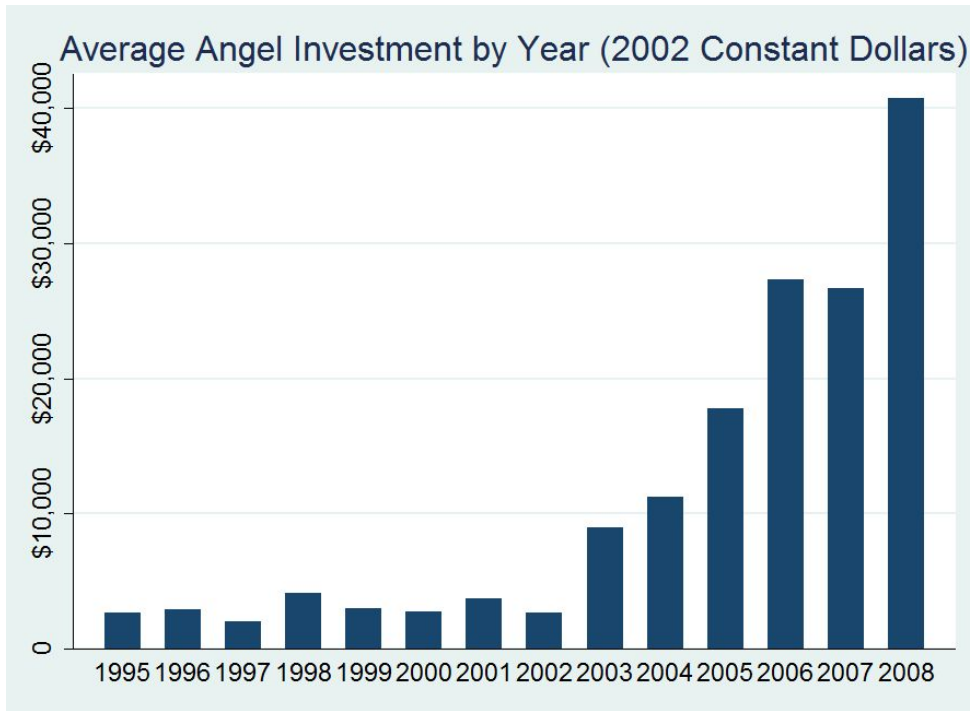


Figure #4: Number of Angel Transactions by Year

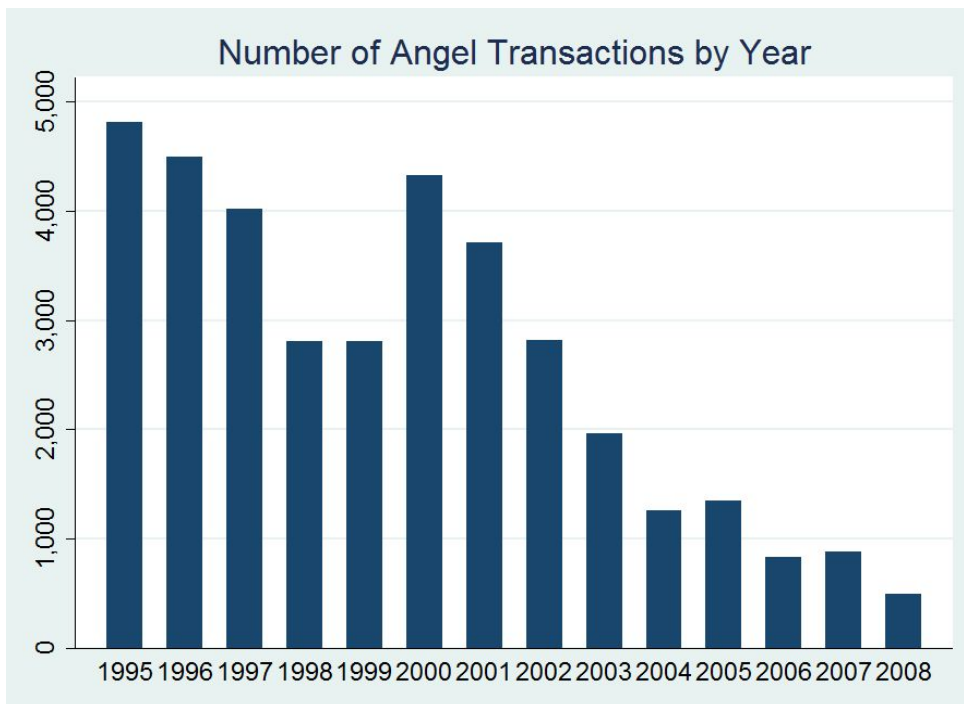
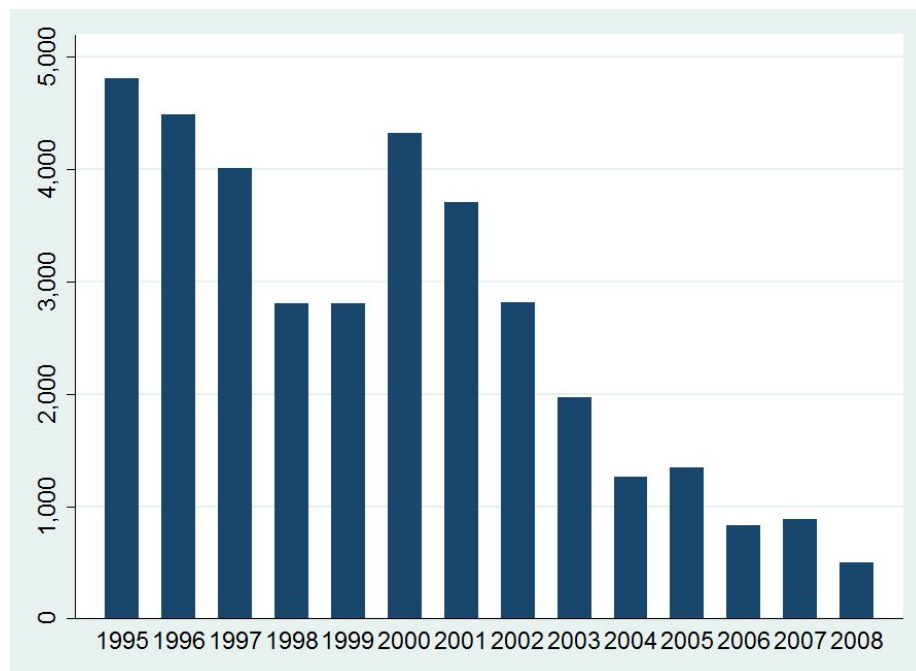


Figure #5: Number of Unique Angel Investors by Year



## Tables

Note:

\* - Significant at the 1% level.

\*\* - Significant at the 5% level.

\*\*\* - Significant at the 10% level.

Table #1: Number of Angel Transactions by Region (1995-2008)

region	Freq.	Percent	Cum.
Vancouver North	3,363	8.23	8.23
Vancouver	9,058	22.16	30.38
Vancouver East	4,200	10.27	40.66

Vancouver South	6,398	15.65	56.31
Vancouver South East	5,907	14.45	70.75
Northern BC	1,072	2.62	73.38
Chilliwack	548	1.34	74.72
Fraser Valley	884	2.16	76.88
Greater Victoria	4,457	10.9	87.78
Kamloops	1,667	4.08	91.86
Kootenay	169	0.41	92.27
Okanagan - Mainline	1,497	3.66	95.93
Powell River	56	0.14	96.07
South Okanagan	281	0.69	96.76
Vancouver Island	1,325	3.24	100
<b>Total</b>	<b>40,882</b>		

Table #2: Summary Statistics

Variable (Real + per capita)	Mean	Std. Dev.	Min	Max
Total Angel Investment	3.510024	3.811213	0.0113202	16.57795
Local Angel Investment	2.175857	3.000596	0	14.6747
External Angel Investment	1.334166	1.490155	0.0002209	6.922975
Number of Investments	0.0009078	0.0011099	0.000054	0.0062851
Unique Investors	0.0004938	0.0004126	0.000054	0.0020527
Initial Investors	0.000161	0.000123	0	0.0006058

Log House Price Growth	0.0771261	0.0611312	-0.052178	0.2113514
Volatility - mdev	0.0458551	0.029678	0.0120909	0.1718395
Volatility - sd	0.0604106	0.0373498	0.016586	0.2173415

Table #3: Real Angel Investment per Capita (2001-2008)

	Individual Coefficient Estimates	Std. Error	Equ. (1)	Std. Error	Equ. (2)	Std. Error
<i>Log Regional House Price Growth</i>	13.97083***	7.219052	14.02076**	6.423595	14.25083**	6.378025
<i>Volatility - MDEV</i>	-26.60679***	14.07468	-21.99252***	12.66947		
<i>Volatility - SD</i>	-23.63583**	10.9944			-19.4646***	9.981035
<i>Local Business Incorporations</i>	0.001699*	0.0005035	0.0015202*	0.0004855	0.0014745*	0.0004844
<i>Prime Lending Rate</i>	0.4707853	0.3581927				
<i>TSX</i>	0.0000231	0.0001303				
<i>TSX Venture</i>	0.0001765	0.000387				
Number of Observations	64		64		64	
Year Fixed Effects	Yes (except Prime, TSX, TSX Venture)		Yes		Yes	
Region Fixed Effects	Yes		Yes		Yes	
Adjusted R-Squared:						
Within			0.3619		0.372	
Between			0.4322		0.4235	
Overall			0.3877		0.3849	

Table #4: Real Local Angel Investment per Capita (2001-2008)

	Individual Coefficient Estimates	Std. Error	Equ. (3)	Std. Error	Equ. (4)	Std. Error
<i>Log Regional House Price Growth</i>	11.50872***	6.045127	11.69096**	5.589075	11.87057**	5.558956
<i>Volatility - MDEV</i>	-21.73473***	11.79236	-18.92187***	11.02352		
<i>Volatility - SD</i>	-18.9492**	9.231689			-16.42474***	8.699267
<i>Local Business Incorporations</i>	0.0011807*	0.0004364	0.0010279**	0.0004224	0.0009916**	0.0004222
Number of Observations	64		64		64	
Year Fixed Effects	Yes		Yes		Yes	
Region Fixed Effects	Yes		Yes		Yes	
Adjusted R-Squared:						
Within			0.3192		0.3277	
Between			0.4644		0.4578	
Overall			0.3983		0.3976	

Table #5: Real External Angel Investments per Capita (2001-2008)

	Individual Coefficient Estimates	Std. Error
<i>Log Regional House Price Growth</i>	2.46211	3.860633
<i>Volatility - MDEV</i>	-4.872062	7.51335
<i>Volatility - SD</i>	-4.686629	5.915729
<i>Local Business Incorporations</i>	0.0005184***	0.0002799
Number of Observations	64	
Year Fixed Effects	Yes	
Region Fixed Effects	Yes	

Table #6: Number of Angel Investments per Capita (2001-2008)

	Individual Coefficient Estimates	Std. Error
<i>Log Regional House Price Growth</i>	0.0005861	0.0022339
<i>Volatility - MDEV</i>	-0.0150983*	0.0037662
<i>Volatility - SD</i>	-0.0118526*	0.0029768
Number of Observations	64	
Year Fixed Effects	Yes	
Region Fixed Effects	YEs	

Table #7: Unique Angel Investors per Capita (2001-2008)

	Individual Coefficient Estimates	Std. Error
<i>Log Regional House Price Growth</i>	0.0006806	0.0006886
<i>Volatility - MDEV</i>	-0.0036774*	0.0012455
<i>Volatility - SD</i>	-0.0030361*	0.0009743
Number of Observations	64	
Year and Region Fixed Effects	Yes	

Table #8: Initial Angel Investments per Capita (2001-2006)

	Individual Coefficient Estimates	Std. Error
<i>Log Regional House Price Growth</i>	0.0001778	0.0003525
<i>Volatility - MDEV</i>	-0.0009988**	0.000468
<i>Volatility - SD</i>	-0.0008933**	0.0003795
Number of Observations	48	
Year Fixed Effects	Yes	
Region Fixed Effects	Yes	

Table #9: Census Extension (1996, 2001, 2006)

	Individual Coefficients	Std. Error
<i>Real Income</i>	0.0007369	0.0004421
<i>Unemployment Rate</i>	49.93422	136.6063
<i>Bachelor Degrees per Capita</i>	24.27838	139.551
<i>Master Degrees per Capita</i>	1244.785**	385.8277
<i>Ph.Ds per Capita</i>	145.2582	549.6217
Number of Observations	16	
Year & Region Fixed Effects	Yes	

Table #10: Summary Statistics - GVRD

Variable (Real + per capita)	Mean	Std. Dev.	Min	Max
Total Angel Investment	4.9665	4.147412	0.1770738	16.57795
Local Angel Investment	3.43179	3.196338	0.1439399	14.6747
External Angel Investment	1.53471	1.747327	0.0002209	6.922975
Number of Investments	0.0011732	0.0013201	0.0000775	0.0062851
Unique Investors	0.0006092	0.000472	0.0000727	0.0020527
Initial Investors	0.0001961	0.0001335	0.0000365	0.0006058
Log House Price Growth	0.0427186	0.0616478	-0.0700293	0.1683474
Volatility - mdev	0.0411027	0.0295529	0.0089567	0.1718395
Volatility - sd	0.0536874	0.0371592	0.0132095	0.2173415

Table #11: Real Angel Investment per Capita (2001-2008)

	Individual Coefficient Estimates	Std. Error	Equ. (5)	Std. Error	Equ. (6)	Std. Error
<i>Log Regional House Price Growth</i>	32.18705*	12.10619	28.97643*	11.15301	28.86743*	11.06944
<i>Volatility - MDEV</i>	-32.768	20.41096	-26.15342	17.82411		
<i>Volatility - SD</i>	-28.80169***	15.97385			-22.29646	14.13109
<i>Local Business Incorporations</i>	0.0018043*	0.0006723	0.0012735**	0.000641	0.0012251***	0.0006426
<i>Prime Lending Rate</i>	0.7811004	0.5574356				
<i>TSX</i>	0.0001048	0.0002046				
<i>TSX Venture</i>	0.0004548	0.0006084				
Number of Observations	40		40		40	
Year Fixed Effects	Yes (except Prime, TSX, TSX Venture)		Yes		Yes	
Region Fixed Effects	Yes		Yes		Yes	
Adjusted R-Squared:						
Within			0.4802		0.4866	
Between			0.3677		0.357	
Overall			0.3668		0.3639	

Table #12: Real Local Angel Investment per Capita (2001-2008)

	Individual Coefficient Estimates	Std. Error	Equ. (7)	Std. Error	Equ. (8)	Std. Error
<i>Log Regional House Price Growth</i>	21.4849**	10.63124	18.84853***	10.10564	18.82439***	10.01577
<i>Volatility - MDEV</i>	-21.5583	17.23132	-19.81625	16.15026		
<i>Volatility - SD</i>	-23.07641***	13.46965			-17.67014	12.786
<i>Local Business Incorporations</i>	0.001398**	0.0005749	0.0010273***	0.0005808	0.00098***	0.0005815



Number of Observations	40		40		40	
Year Fixed Effects	Yes		Yes		Yes	
Region Fixed Effects	Yes		Yes		Yes	
Adjusted R-Squared:						
Within			0.4218		0.4305	
Between			0.4991		0.4877	
Overall			0.4131		0.4134	

Table #13: Real External Angel Investment per Capita (2001-2008)

	Individual Coefficient Estimates	Std Error
<i>Log Regional House Price Growth</i>	10.70215***	5.433877
<i>Volatility - MDEV</i>	-7.2097	9.0228
<i>Volatility - SD</i>	-5.725273	7.140744
<i>Local Business Incorporations</i>	0.0004063	0.0003137
Number of Observations	40	
Year Fixed Effects	Yes	
Region Fixed Effects	Yes	

Table #14: Demand vs. Supply Effect Test

*Note: Estimates include year fixed effects. Regional fixed effects were not included.*

	Eq (1)		Eq (2)		Eq (3)	
Number of Investments in Region X	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
crd_change	26.83076	189.6121				
gvrd_change			-607.372	1941.354		

gvr_d_mdev			455.919 4	1727.62		
kamloops_change					-121.660 7	181.036
kamloops_mdev					-416.540 3	1078.11 6
kelowna_change					214.691 2	409.426 6
kelowna_mdev					483.460 9	868.924