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Some Evidence on Tax Policy Effects on Sunspots from the U.S. Taxpayer Relief Act of 1997

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In this paper, I determine whether fiscal or tax policy could have increased nonfundamental volatility or "sunspots" in the United States in the early- to mid-2000s. In particular, I investigate the U.S. Taxpayer Relief Act of 1997. I examine housing price volatility before and after 1997 utilizing the Case-Shiller quarterly national and regional (MSA) home price indexes and U.S. Federal Housing Finance Agency (formerly OFHEO) quarterly HPI (house price index) and POI (purchase only index). The empirical results suggest that national and regional housing price volatility, especially nonfundamental price volatility, increased after 1997. The increase in housing price volatility caused by misguided tax policies could be useful lessons for other countries facing renewed property price speculation.

Field of Research: Real Estate Finance, Tax Policy

1. Introduction

Subprime mortgages and home equity lines of credit (HELOCs), intended to increase homeownership and consumption levels, have been broadly blamed for the "housing bubble" in the United States in the early- to mid- 2000s and the subsequent crash. Other explanations include: (1) subprime lending largely was displacing other loans that would have been made; (2) the problem with prices was primarily in the supply of new housing, not with the availability and cost of mortgage credit; (3) the problem was not subprime lending per se, but the Fed's dramatic reductions, then increases in interest rates during the early- to mid- 2000s; (4) the housing "boom" was concentrated in markets with significant supply-side restrictions, which tend to be more price-volatile; and (5) the problem was primarily one of fraud and/or misrepresentation on the part of aggressive mortgage underwriters or borrowers, not in the presence of subprime lending per se (Vandell 2008). There have also been suggestions that the Fed's dramatic reductions, then increases in interest rates during the early- to mid- 2000s could have played a role in increasing housing price volatility. Monetary policy deviations during 2002 to 2005 might have been the cause of the boom and subsequent bust in housing starts and inflation (Taylor 2007). However, Shiller (2007b) pointed out that Taylor did not present an analysis of the model's success in the period before 2000 and disputed Taylor's findings. More recently, it was concluded that lower interest rates could explain only one-fifth of the rise in U.S. housing prices from 1996 to 2006 (Glaeser, Gottlieb & Gyourko 2010). With respect to the Japanese real estate bubble in the 1980s, Meltzer (1995)

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reported that M1 growth in Japan rose from 3.5% for 1982-1985 to 8.1% in 1985-1988. Meltzer also pointed out that since land is the most durable asset, the increase in M1 growth would increase the price of land. However, Noguchi (1994, p.11) examined the “bubbles vs. fundamentals” argument in Japan and concluded that “the land price appreciation during the 1980s cannot be explained unless the bubble element is introduced”. Monetary policy therefore only acted as a catalyst and not a cause for the Japanese housing price bubble in the late 1980s and the United States housing price bubble in the early- to mid- 2000s.

In this paper, I investigate empirically whether fiscal or tax policy could have increased nonfundamental volatility and thereby created a “housing bubble” and a subsequent crash. Previously, I had introduced a simple general equilibrium model of housing demand to explain short-run booms and busts in the housing market. I suggested that speculation could cause cyclical movements around the fundamental long-run price, and such speculation arose from the existence of stationary sunspot equilibria (Lim 1997). I then extended the model by incorporating home equity lending (or mortgage borrowing) which was missing in the earlier work (Lim 2009). In economic theory, stationary sunspot equilibria are multiple equilibrium paths around a steady state where the actual path, undetermined by fundamentals, is determined by nonfundamentals or sunspots. Although sunspot prices are stochastic and reflect all publicly available information, they also reflect extraneous information and are excessively volatile.

’Sunspots’ is short-hand for ‘the extrinsic random variable’ upon which agents coordinate their decisions, that is, one that does not affect economic fundamentals, but can affect economic outcomes. Sunspots are said to matter when the allocation of resources depends in a non-trivial way on the realization of the sunspot variable. Sunspot equilibria are instances of ‘excess volatility’. They arise even when expectations are fully rational. The market economy is a social system. In attempting to optimize her own actions, each agent must attempt to predict the actions of the other agent. An entrepreneur is uncertain about the moves of her customers and her rivals, and they of her moves. It is not surprising that this process may generate uncertainty in outcomes even in the extreme case in which the fundamentals are non-stochastic. The uncertainty generated by the economy is market uncertainty. It is either created by the economy or adopted from outside the economy as a means of coordinating plans of individual agents. Market uncertainty is not transmitted through the fundamentals. It can be driven by extrinsic uncertainty. Sunspot models are complete general equilibrium models that offer an explanation of excess volatility. It was by no means a new idea that economies can and do generate excess volatility, but the sunspots model is the first general-equilibrium model to exhibit excess volatility even when agents are fully rational. (Shell 2008)

Woodford (1984) suggested that preventing sunspot equilibria is a worthy object of policy intervention. Goenka (1994) was the first to demonstrate how fiscal policy could eliminate extrinsic uncertainty and thus nonfundamental volatility. In similar fashion, I suggested how tax policy could be used to eliminate sunspots in housing markets and possibly avert future housing crises. If this tax policy is not followed, housing price volatility could increase (Lim 1997, 2009). In this paper, I examine Case-Shiller home price indexes and U.S. Federal Housing Finance Agency (formerly OFHEO) house price (HPI) and purchase only (POI) indexes to investigate whether housing price volatility in the U.S. increased after the Taxpayer Relief Act of 1997 which exempted a significant amount of short-term housing capital gains. If so, it would be evidence that misguided tax policy could generate sunspots (or increase nonfundamental volality).

2. Related Literature

Shiller (2007b) has looked at a broad array of evidence, and has found that it does not appear possible to explain the housing boom in terms of fundamentals such as rents or construction costs. Glaeser, Gottlieb and Gyourko (2010) have found no convincing evidence that changes in approval rates or loan-to-market levels could explain the bulk of changes in house prices. They suggest that better corrections for the endogeneity of borrowers' decisions to apply for mortgages need to be made. Therefore, a psychological theory, that represents the boom as taking place because of a feedback mechanism or social epidemic that encourages a view of housing as an important investment opportunity, fits the evidence better. A housing bubble blog[2] considers the demand-driven housing bubble as follows: "Countless people that I know and you may know had a psychological desire to own a home that they bought homes in the last few years disregarding all evidence that a bubble was imminent. Many felt that if the housing payment became too much, they would simply sell. Others had dreams of making a hefty sum when home appreciation hit 20+ percent on a year over year basis … Surreal. Something was not right about that. And the fact that housing has steadily been declining … shows how we were in fact in a bubble fueled by easy financing and to a larger extent, greed." This blog also mentioned widely-held, but mistaken, beliefs like "leasing is equivalent to flushing money down the toilet" which led many to buy homes at inflated bubble prices. Shiller (2007b, p.7) argued that "a significant factor in this boom was a widespread perception that houses are a great investment, and the boom psychology that helped spread such thinking". These beliefs were compounded by a "burgeoning of real estate advertisements" (Shiller 2007a, p.20). Most people also mistakenly cited low interest rates, instead of expected rates of house price appreciation, as the main motivator of a good time to buy a house (*ibid* p.21). "Money illusion" also appeared to be an important factor (Shiller 2007c).

Shilling (2003) found that *ex ante* expected risk premiums on real estate were quite large for their risk, too large to be explained by standard economic models. Furthermore, the results suggested that *ex ante* expected returns were higher than average realized returns from 1988-2002, indicating that real estate experienced unexpected capital losses. As Shilling (2003, p.502) found that "investors appear to price all property types in the same way", for simplicity, this paper would only consider residential housing and ignore commercial real estate in order to focus on how investors form their expectations. The indeterminacy of equilibria led to "the fact that real estate investors appear to be no more uncertain about expected future returns after a decrease in price and fall in return than after an increase in price and return" (Shilling 2003, p.502). This indeterminacy might also explain Shiller's (2007a) finding that the causes of turning points in real estate remain fuzzy.

Shell (2008) noted that sunspots could also arise from *buyer* search and associated nonconvexities. One of the earliest stopping-rule search models was developed by MacQueen and Miller Jr. (1960). Turnbull and Sirmans (1993) applied this model to *buyer* search behavior as follows: "The buyer's problem is to find the optimal search stopping rule or reservation price p^* which requires the buyer to continue searching until p* is found." Housing prices thus entered the utility function either through the net value of the house (which depended on p) or through leisure (which was reduced with longer search depending on $f(p)$). I have postulated other reasons for having housing prices in the utility function from the extant literature (Lim 1997): (1) Generalized wealth effects in expected utility (Dusansky and Wilson 1993); (2) Endogenous consumption risks (Turnbull 1994); (3) Scitovsky effects (Scitovsky 1945); (4) Neighborhood effects or "location, location, location" (Veblen 1899; Samuelson 1972; Goodman 1989).

3. Sunspot Model of Housing Demand

As is common in the extant literature, housing is assumed to be the only real asset and each agent is constrained to consume the same amount of housing that she has in her investment portfolio. For ease of exposition and without loss of generality, the general equilibrium model I used in Lim (1997, 2009) is *deterministic* or *nonstochastic*. There are many identical infinitely-lived agents who enter any given period holding last period's housing stocks (which could be zero) and possibly having to repay their home equity loan or mortgage. An amount of the consumption good is endowed to each agent each period, and to close the general equilibrium model, each agent owns shares of the exogenous mortgage or lending institution from which each agent receives a dividend of the consumption good each period. Each agent has the opportunity of taking out a home equity loan or mortgage. Agents must then decide how to allocate their consumption good endowment, dividend, housing wealth and new mortgage loan between current consumption, new housing and mortgage repayment.

Agents receive utility from the consumption good and housing. Housing consumed this period becomes part of an agent's wealth next period, and thus housing is both a consumption and an investment good. More importantly, housing prices p_t are also modeled in the utility function. The overall utility of consumption over all periods is given by discounting the stream of utilities subject to each period's budget or loan constraint. The loan constraint simply states that agents could not borrow more than the value of their homes. Given this setup, the optimality conditions for the agent's problem could be found by setting up the Lagrangean and finding the partial derivative with respect to the consumption good and housing, and noting the Kuhn-Tucker conditions. Proposition 3.1 (Lim 1997, 2009) shows that there exists a steady state housing price $\mathbf{p}$ and steady state values of all other variables could be derived from this steady state price. The Implicit Function Theorem used in the proof of Proposition 3.1 only implies that there is a unique steady state value of $\mathbf{p}$. It does not imply that the equilibrium path of p_t is unique. Proposition 3.2 (Lim 1997, 2009) then shows that $p_{t+1} = g(p_t)$ and that g is forward stable for a nonempty, open set of economies where it is possible to construct an equilibrium path around the steady state such that $p_t = \mathbf{p} + = \varepsilon_t$, $p_{t+1} = \mathbf{p} + = \varepsilon_{t+1}$, … for sufficiently small $\{\varepsilon_t\}$, where the $\{\varepsilon_t\}$ are independently and identically distributed random variables with mean zero. This means the equilibrium path of $\{p_t\}$ is locally nonunique or indeterminate. The indeterminacy leading to sunspot equilibria is due to multiple equilibria where coordination failures could result in a time path that appears (nonfundamentally) stochastic even though the economy is (fundamentally) deterministic.

That g is forward stable is sufficient for sunspots to matter in the equilibrium path of housing prices $\{p_t\}$. Utilizing the bootstrapping technique, I then construct a large family of equilibria by replacing **p** with **p** + $\{\varepsilon_t\}$ such that $p_{t+1} = \mathrm{g}(p_t, \varepsilon_t)$ is the forecast function used by agents. Proposition 3.3 (Lim 1997, 2009) shows there exists an invariant measure for this forecast function. Hence by Rosenblatt's theorem, there exists an invariant distribution for the price formation process (p_t, ε_{t-1}). This distribution, together with the forecast function g constitutes a stationary rational expectations equilibrium. Since the random variable ε_t is nondegenerate, the equilibrium is stochastic. In short, there exists a nonempty, open set of economies exhibiting nontrivial stationary sunspot equilibria. The volatility in housing prices would lead to volatility in all the other variables, even if the fundamental economy is deterministic or nonstochastic.

Even though our economy was fundamentally deterministic or nonstochastic, sunspots were found to matter, and nonfundamental or excess volatility ensued. If this model had fundamental uncertainty, then with multiplicity of equilibria, coordination failures in expectations formation could result in nonfundamental price paths with higher volatility than what would have been generated by fundamentals alone. That the deviation of house prices from fundamentals is due to price dynamics rather than a reaction to fundamentals is consistent with the empirical evidence that studied actual house prices relative to fundamentals in New Zealand and found disparities between actual and fundamental real house prices, that is, the existence of real house price bubbles (Fraser *et al.* 2008).

4. Tax Policy Implications of the Sunspot Model

In a general equilibrium model with no lending/borrowing (e.g., no mortgages), I found that there exists a tax policy which would make the steady state determinate, that is, for the housing price evolution function, $p_{t+1} = \mathrm{g}(p_t)$, g is no longer forward stable. The tax policy is as follows: if housing and other consumption are complements (substitutes), then housing should be taxed (subsidized). If housing and other consumption are complements and housing is subsidized, then sunspots are more likely to occur since the set of economies (that is, agent preferences) would be larger. I then studied Japanese data and found that housing and other consumption were complements in 1986-1991, yet there was a net subsidy to housing in Japan at that time. This resulted in the Japanese real estate bubble of the late 1980s to early 1990s and the increase in volatility that ensued (Lim 1997).

I subsequently added lending/borrowing (e.g., mortgages) to my 1997 model and found that in a model with home equity lending, the optimal tax policy for most economies would be a net tax to housing (which differs from the 1997 result). Even if housing and the other consumption good are substitutes, housing should be taxed unless the substitution effect is sufficiently strong. That is, with home equity lending, a housing tax would generally curb nonfundamental or excess volatility in housing prices. The reason is that with home equity lending, there is a propensity for agents to speculate with borrowed funds as they are no longer constrained by their own wealth. This speculation should be discouraged with a tax. Now if a different tax policy is followed, for example if housing is not taxed and the substitution effect is not sufficiently strong, then sunspots would be more likely to occur (Lim 2009). The increased speculation would decrease social welfare for risk averse agents by Jensen's inequality (Shell 2008). The next section presents some empirical evidence from the U.S. for this result.

5. The Effect of the U.S. Taxpayer Relief Act of 1997

The U.S. Taxpayer Relief Act of 1997 exempted the first $500,000 in capital gains from any home sale when the home is held for only two years. It was a very significant reduction (in most cases, an elimination) of the capital gains tax for short-term housing speculation (e.g., flipping). The data are the U.S. Federal Housing Finance Agency (formerly OFHEO) HPI (house price index) and POI (purchase only index), and Case-Shiller quarterly national home price index, as these indexes are the most commonly used data sets to study house price inflation and "bubbles" (Glaeser, Gottlieb and Gyourko 2010; Shiller 2007b; Vandell 2008). Based on the theoretical results as discussed previously, we postulate the following hypotheses:

H0: The volatility of housing price returns increased after 1997.

H1: The volatility of housing price returns increased more than the volatility of fundamental factors affecting housing price returns pre- and post-1997.

H2. Nonfundamental housing price volatility (as measured by the variance of residuals after controlling for fundamental factors) increased after 1997.

The U.S. Federal Housing Finance Agency HPI and POI series started in 1991. Table 1 (below) shows that the volatility of HPI and POI returns increased significantly from the period 1991-1997 to the period after 1997, suggesting that the reduction or elimination of short-term capital gains tax on housing did increase house price volatility as measured by these two indexes.

Table 1: Volatility of HPI and POI Returns Before and After 1997

	HPI % Δ Qtr	HPI % Δ Yr	POI % Δ Qtr	POI % Δ Yr
σ (1991-1997)	0.5%	1.12%	0.36%	0.56%
σ (1998-)	1.38%	4.57%	1.32%	4.97%

Table 2: Case-Shiller National Index Returns and Risk Premiums (Excess Returns) Volatility (Composite U.S. Seasonally Adjusted), Quarterly, Before and After 1997:

	Quarterly Returns	Quarterly Risk Premiums
σ (1987-1997)	0.817156%	0.802664%
σ (1998-2009)	2.687065%	2.674364%

The other commonly used data series of house prices is the Case-Shiller quarterly national home price index. Table 2 (above) shows that the volatility of returns as measured by the Case-Shiller National Index increased significantly from the period 1987-1997 to the period after 1997, suggesting that the reduction or elimination of short-term capital gains tax on housing did increase house price volatility as measured by the Case-Shiller National Index as well. A longer time frame (decade) of data (compared to the normal time frames of event studies) is necessary for this study as I am examining the *volatility* of returns and not their time series movement. I have also examined regional volatility using the Case-Shiller MSA Index Returns and found that house price volatility increased after 1997 *in every region of the USA*! In short, the data do not reject H0.

Now sunspot equilibria is a nonfundamental phenomenon. The empirical analysis thus far examined total volatility; in order to examine nonfundamental volatility, we need to control for fundamentals. Table 3 (below) shows that the volatility of fundamentals increased after 1997, but the volatility of the S&P 500 index increased by only about 10%, while the volatility of quarterly GDP growth increased by 40%. By comparison, HPI return volatility almost tripled (increased 200%) and POI return volatility almost quadrupled (increased 300%) after 1997. The volatility of Case-Shiller quarterly returns and risk premiums (excess returns) more than tripled (increased more than 200%) after 1997. In short, the data do not reject H1 and the increase in volatility of fundamentals could explain only a small portion of the increase in volatility of house prices after 1997, suggesting that most of the house price volatility increase after 1997 was nonfundamental!

Table 3: Volatility of Several Fundamentals, Quarterly, Before and After 1997:

	S&P500 Qtr Excess Returns	Qtr GDP Growth
σ (1987-1997)	6.8486%	0.5152%
σ (1998-2009)	7.5941%	0.7071%

More formally, a multiple regression which controls for fundamental variables is run. The results are presented in Table 4 (below). The dependent variable is the Case-Shiller U.S. Quarterly Risk Premium or Excess Return, which is the Case-Shiller national index quarterly return less the risk-free rate (measured by the 3-month t-bill rate). We control for the above fundamental variables, the S&P 500 Quarterly Excess Return, which is the S&P 500 quarterly return less the risk-free rate (measured by the 3-month t-bill rate), and the Quarterly GDP Growth rate. The multiple regression first shows that Quarterly GDP Growth is significant in explaining house price changes, consistent with the notion that aggregate house prices are fundamentally driven by aggregate income. What we are interested in, however, are the residuals from the multiple regression, that is, what is not explained by the independent fundamental variables. Table 4 (below) shows that the volatility or standard deviation of these residuals, otherwise known as the standard error of the regression, almost quadrupled (increased almost 300%) from 1987-1997 to 1998-2009. The increase in standard error resulted in a lower R-square and F-statistic after 1997. In short, the multiple regression results do not reject H2 that nonfundamental house price volatility increased significantly after 1997, that is, after the reduction or elimination of the short-term capital gains tax on housing.

Table 4: Multiple Regression with Case-Shiller U.S. Quarterly Risk Premium (Excess Return) as Dependent Variable and S&P 500 Quarterly Return and Quarterly GDP Growth as Independent Variables, 1987-1997 and 1998-2009 (*: 5% sig)

	1987-1997		1998-2009	
	Coefficient	**T-statistic**	**Coefficient**	**T-statistic**
Intercept	-0.014112849*	-8.1240061	-0.007746448	-1.6677138
S&P500 Qtr Excess Ret.	-0.001882663	-0.1289719	0.048163436	0.9622798
Qtr GDP Growth	0.989383928*	5.4028179	1.787437208*	3.4075189
Δ 30 yr Mortgage Rate	0.29752069	1.1998943	-0.151149698	-0.1228826
Std.Error(Var.Residual)	**0.0061358 (0.00003496)**		**0.0234622 (0.00051534)**	
R-Square (Adj.R-square)	0.4573897 (0.4156505)		0.2794704 (0.2303434)	
F-statistic(SignificanceF)	10.95826 (0.0000235)		5.68873 (0.0022134)	
Number of Observations	43		48	

As the data do not reject H0, H1 and H2, it may be concluded that nonfundamental housing price volatility increased after the U.S. Taxpayer Relief Act of 1997. The evidence suggests that the housing price bubble and subsequent crash in the United States in the early- to mid- 2000s was caused by this 1997 Act which generated nonfundamental or excess volatility in housing prices, and subsequent home equity lending losses which precipitated a mortgage crisis. By placing housing in a special privileged category for capital gains tax purposes, excess volatility in housing prices ensued. To reduce housing price volatility, it is suggested that the holding period for the capital gain exemption for housing be increased to discourage speculation or "flipping".

6. Conclusion

This paper began with a brief explanation of stationary sunspot equilibria and how these generate excess volatility in home prices. Spear (1989) showed how sunspots could spill over from one country to another, as one country's price could serve as the sunspot for the other country. Thus nonfundamental or excess volatility in one country's housing prices could lead to financial contagion resulting in an international credit crunch. To mitigate sunposts, Lim (1997) derived a tax policy whereby there should be a net tax (subsidy) to housing if housing and other consumption are complements (substitutes). With home equity lending added (Lim 2009), unless housing and other consumption were strong substitutes, there should be a net tax on housing instead.

More than two decades ago, there was a housing price bubble in Japan. The underlying cause of this bubble during the 1980s was extrinsic, exacerbated by misguided tax policies. The major cultural factor was that the Japanese regarded a house as an asset that produced capital gains. It was said that they would buy a house to own rather than to live. Hulme (1996) called this a "land myth" – the pernicious notion that real estate prices could never go down. Compounding the belief that prices could only go up was a sense of limited supply. The "land myth" was a liquidity catalyst, a means to borrow money based on speculation. Between 1984 and 1989, total bank lending grew an average of 9.2% a year, while lending related to real estate grew at a rate of 20% a year. The Japanese housing price bubble was thus amplified by careless lending in the banking sector as financial institutions began "selling money" (Yamamuro 1996). This resulted in home equity lending losses. I estimated from Japanese data that housing is likely to be complementary to consumption, and suggested that the complementary effect of housing is likely to hold in most countries. Therefore, I suggested that a heavier burden on housing and real estate taxes would decrease speculation. This could be implemented by raising the assessments for property taxes (which Ito (1994) says is what "all economists in Japan recommend"), a cautious increase in capital gains taxes for real estate transactions, and a landholding tax to raise the cost of holding land for speculative interests. The last suggestion was actually implemented by the Japanese Government in 1992 to curb short-term property price speculation.

The late 1980s housing bubble in Japan is certainly similar to the housing price bubbles in the United States and other countries (like the United Kingdom) in the 2000s. The U.S. Taxpayer Relief Act of 1997 exempted the first $500,000 in capital gains from any home sale when the home is held for only two years. I have examined housing price volatility before and after 1997 utilizing the Case-Shiller quarterly national and regional (MSA) home price indexes and U.S. Federal Housing Finance Agency (formerly OFHEO) quarterly HPI (house price index) and POI (purchase only index). The empirical results suggest that national and regional housing price volatility, especially nonfundamental price volatility, increased after 1997. Now this tax change reduced the holding period to two years for a $500,000 capital gain exemption, which represents a tax reduction (and in most cases, a tax elimination) for real estate speculators (or "flippers"). It is therefore suggested that the housing price bubble in the United States in the early- to mid- 2000s was caused by this Act of 1997. It generated excess volatility in housing prices, and subsequent home equity lending losses which precipitated a mortgage crisis. By placing housing in a special privileged category for capital gains tax purposes, excess volatility in housing prices ensued. To reduce housing price volatility, it is suggested that the holding period for the capital gain exemption for housing be increased to at least 5 years, perhaps even as long as 10 years (with certain allowances for job relocation).

In conclusion, I have suggested a theoretical *demand-side* explanation for the "housing bubble" in the United States in the early- to mid- 2000s, and the subsequent crash and mortgage crisis. The major contribution of this paper could be in its tax policy recommendation: to mitigate nonfundamental or excess volatility in housing prices, there should generally be a net tax on housing speculation (similar to a "Tobin tax" on currency speculation). This tax would increase welfare by reducing housing price volatility for current and future homeowners. In particular, taxes on short-term housing capital gains should increase. The increase in housing price volatility in the U.S. and Japan (more than a decade earlier) caused by misguided tax policies could be useful lessons for other countries facing renewed property price speculation.

Endnotes

[1.] I thank Andrea Heuson for her suggestion at the 2009 Reno FMA Conference to test the theoretical propositions of my 1997 and 2009 papers by examining housing price volatility before and after the U.S. Taxpayer Relief Act of 1997 which reduced capital gains taxes for real estate speculators. Comments from participants at the 2011 Beijing GSSBR and the 2011 Jeju AsRES/AREUEA Joint International Conference (especially Gary Painter) are also appreciated.

[2.] http://www.doctorhousingbubble.com, January 6th, 2008.

References

Bajaj, V & Leonhardt, D 2008, 'Tax Break May Have Helped Cause Housing Bubble', *New York Times*, 18 December, 2008.

Dusansky, R & Wilson, PW 1993, 'The Demand for Housing: Theoretical Considerations', *Journal of Economic Theory*, vol. 61, pp. 120-138.

Fraser, P, Hoesli, M & McAlevey, L 2008, 'House Prices and Bubbles in New Zealand', *Journal of Real Estate Finance and Economics*, vol. 37, no. 1, pp. 71-79.

Glaeser, EL, Gottlieb, JD & Gyourko, J 2010, 'Can Cheap Credit Explain the Housing Boom?' *NBER Working Paper No. w16230*, National Bureau of Economic Research, Cambridge, MA, USA.

Goenka, A 1994, 'Fiscal Rules and Extrinsic Uncertainty', *Journal of Economic Theory*, vol. 4, no. 3, pp. 401-416.

Goodman, AC 1989, 'Topics in Empirical Urban Housing Research', in RF Muth & AC Goodman (eds), *The Economics of Housing Markets*, Harwood Academic, Reading, UK.

Hulme, D 1996, 'Explosion of Japan's 'Land Myth'', *Asian Business*, vol. 32, no. 7, pp. 53-54.

Ito, T 1994, 'Public Policy and Housing in Japan', in Y Noguchi & JM Poterba (eds), *Housing Markets in the United States and Japan*, University of Chicago Press, Chicago, IL, USA, pp. 215-256.

Lim, W 1997. 'Observing Sunspots at Home', *Journal of Housing Economics,* vol. 6, pp. 203-222.

Lim, W. 2009. 'Contagion And Sunspots Surrounding Speculative Home Equity Lending Losses', paper presented at the *Financial Management Association 2009 International Meeting*, Reno, NV, USA.

MacQueen, J and Miller, RG 1960, 'Optimal Persistence Policies', *Operations Research* vol. 8, pp. 362-380.

Meltzer, AH 1995, 'Monetary, Credit and (Other) Transmission Processes: A Monetarist Perspective', *Journal of Economic Perspectives*, vol. 9, pp. 49-72.

Noguchi, Y 1994, 'Land Prices and House Prices in Japan'. in Y Noguchi & JM Poterba (eds), *Housing Markets in the United States and Japan*, University of Chicago Press, Chicago, IL, USA, pp. 11-28.

Samuelson, PA 1972, *Foundations of Economic Analysis*, Atheneum, New York, NY, USA.

Scitovsky, T 1945, 'Some Consequences of the Habit of Judging Quality by Price', *Review of Economic Studies*, vol. 2, pp. 100-105.

Shell, K 2008, 'Sunspot Equilibrium', in L Blume & S Durlauf (eds), *The New Palgrave Dictionary of Economics, 2nd Edition*, Palgrave Macmillan, Basingstoke, UK.

Shiller, RJ 2007a, 'Historic Turning Points in Real Estate', *Cowles Foundation Discussion Paper No. 1610*, Yale University, New Haven, Connecticut, USA

Shiller, RJ 2007b, 'Understanding Recent Trends in House Prices and Home Ownership', *Cowles Foundation Discussion Paper No. 1630*, Yale University, New Haven, Connecticut, USA.

Shiller, RJ 2007c., 'Low Interest Rates and High Asset Prices: An Interpretation in Terms of Changing Popular Models', *Cowles Foundation Discussion Paper No. 1632*, Yale University, New Haven, Connecticut, USA

Shilling, J 2003, 'Is There a Risk Premium Puzzle in Real Estate?' *Real Estate Economics.*Vol. 31, No. 4, pp. 501-525.

Spear, SE 1989, 'Are Sunspots Necessary?' *Journal of Political Economy*, Vol. 97, No. 4, pp. 965-973.

Taylor, J 2007, 'Housing and Monetary Policy', *NBER Working Paper No. W13682*, National Bureau of Economic Research, Cambridge, MA, USA.

Turnbull, GK 1994, 'Location and Housing Demand with Endogenous Consumption Risk', *Regional Science and Urban Economics*, Vol. 24, pp. 543-563.

Turnbull, GK & Sirmans, CF 1993, 'Information, Search and Housing Prices', *Regional Science and Urban Economics,* Vol. 23, pp. 545-557.

Vandell, KD 2008, 'Subprime Lending and the Housing Bubble: Tail Wags Dog?', paper presented at *The American Real Estate and Urban Economics Association 2008 Annual Conference*, New Orleans, LA, USA.

Veblen, T 1899. *The Theory of the Leisure Class: A Study in the Evolution of Institution*, Macmillan, London, UK/New York, USA.

Woodford, M 1984, 'Indeterminacy of Equilibrium in Overlapping Generations Models: A Survey', *Working Paper,* Columbia University, New York, NY, USA.

Yamamuro, H.1996, 'Bubble, then Double Toil and Trouble', *The Daily Yomiuri*, July 31, p.6.