Housing and the Korean economy

Kyung-Hwan Kim

Department of Economics, Sogang University, CPO Box 1142, Seoul, Republic of Korea

Abstract

This paper explores the nexus between housing and the Korean economy. It starts with an overview of the size, growth, and volatility of residential investment in conjunction with long-term resource allocation and short-term macroeconomic fluctuations. Then, the evolution of housing finance and its implications for recent house price run-up are discussed. The relationships among housing price, consumer spending, and inflation are also investigated. Particular attention is paid to the debate over house price bubbles, housing wealth effects on consumption, and the causality between house price and inflation. The paper concludes with a brief assessment of government intervention to stabilize house prices.
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1. Introduction

Housing is an important sector of the national economy in most countries. Housing is the largest component of household net wealth, representing 30% of world wealth, larger than bonds (27%) or equities (19%). Housing investment, defined as the market value of the structure of new houses and improvements for existing houses, accounts for 2–8% of national output and 10–30% of total fixed capital formation (World Bank, 1993, p. 103). Fluctuations in house prices have a direct impact on the level of macroeconomic activity by influencing private consumption and

E-mail address: kyungkim@sogang.ac.kr.

investment. Simultaneously, housing price is affected by macroeconomic variables such as real income, interest rate, and the supply of credit.

Housing is the most expensive consumer durable good whose price equals a multiple of annual household income. For this reason, the availability and terms of mortgage financing are crucial in determining home ownership and housing consumption. Although the housing finance system varies across countries, it is becoming more and more integrated with the capital market. Since housing loans comprise a large portion of consumer credit, fluctuations in house price can affect the value of collateral and hence the financial soundness of lending institutions.

Most of these features apply to Korea. Housing is a key sector in terms of its size both in stock and in flow measures. Housing stock was estimated to be 36% of the nation's total capital stock in 1996 (Pyo, 1998). According to the 1997 survey of national wealth, the value of structure of residential housing was 55% of real wealth of consumers excluding land. About 54.2% the nation's housing stock was owner-occupied in 2000; and for the seven largest cities it was 47.5% (MOCT, 2004, p. 320). Housing investment has made up 3–9% of GDP and 14–31% of total investment during the last three decades. Housing prices and macroeconomic variables are closely linked to each other. The collapse of house price following the Asian economic crisis in late 1997 and the latest housing price run-up fueled by low interest rates and the expansion of consumer credit are good examples.

Housing is very expensive in Korean cities, especially in Seoul. The ratio between the average apartment price and average household income (Price–Income-Ratio: PIR) in Seoul was 9.15 its peak in 1990, declined to 6.25 in 1997, but rose to 8.9 in 2003 (KB, 2003, p. 42). The housing finance system has been underdeveloped partly due to government policies in the past to steer resources into industrial development to the disadvantage of the housing sector. In recent years, housing finance has expanded substantially as the primary mortgage market has been liberalized and the secondary market created.

A salient feature of the Korean housing sector is pervasive intervention by government to stabilize house prices. Although the microeconomic issues of housing policy are not a major topic of this paper, various regulations have made housing supply very inelastic and contributed to volatility of house prices (see Kim, 1993; Renaud, 1993; Malpezzi and Wachter, 2002).[1]

This paper provides an overview of the housing sector as an integral component of the Korean economy focusing on key aspects of the linkages between the housing sector and the macroeconomy. It is organized into five sections. Following this introduction, Section 2 investigates the behavior of residential investment and the evolution of housing wealth. Section 3 describes the housing finance system and recent trends in credit for housing. Section 4 analyzes housing price trends and the linkages between housing price and consumption as well as inflation. Section 5 concludes the paper with some observations on policy implications.

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[1] Korean housing industry is reasonably competitive. The combined market share of five largest developers in the new apartment market in the past 3 years was 7%.

Table 1
Housing investment: 1970–2002

Period	Percentage share	Maximum	Minimum	Average	Standard deviation	CV	Skewness
1970–1987	GDP	6.8	3.1	4.9	0.89	0.18	0.045
	Total Investment	31.0	17.5	22.2	3.94	0.18	0.713
1988–1996	GDP	8.9	5.3	7.4	1.12	0.16	−0.657
	Total Investment	24.7	18.8	21.5	2.27	0.11	0.238
1997–2002	GDP	6.3	3.9	5.0	1.05	0.21	0.661
	Total Investment	21.4	13.9	17.4	2.51	0.14	0.484
1970–2002	GDP	8.9	3.1	5.6	1.51	0.27	0.675
	Total Investment	31.0	13.9	21.1	3.73	0.18	0.608

2. Housing investment, housing stock, and household wealth

2.1. Size and fluctuations of housing investment

Table 1 presents data on housing investment relative to the size of the economy and total investment from 1970 till 2002. During this period, residential investment accounted for 5.6% of the gross domestic product (GDP) and 21.1% of total investment, ranging from 3.1 to 8.9% and from 13.9 to 31.0%, respectively.[2] These figures are comparable to the world averages of 5.5 and 23.4% reported by the World Bank (1993, p. 102).[3] Although it is not visible from the table, housing investment took a big jump in 1988 and dropped in 1998.[4] These structural breaks represent a major change in government housing policy in 1988 and the outbreak of economic crisis in 1997, which will be discussed later. The table also reports standard deviation, coefficient of variation (CV, the ratio between the standard deviation and the mean) and skewness.

Housing investment fluctuates in response to macroeconomic shocks as well as changes in housing market conditions, and it is one of the most volatile components of Korea's national output. Table 2 summarizes the growth rates and the variations of housing investment and a few other components of GDP. Over the last three decades, residential investment registered an average annual growth rate of 9.1%, exceeding the GDP growth rate which was 7.3%. The coefficient of variation of the growth rate of housing investment was 2.21, much greater than that of consumption and those of other types of investments.

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[2] Both variables are nonstationary in level but stationary in first differences.

[3] The EU average of the housing investment to GDP was 4.9% in 2001 (European Central Bank, 2003, p. 9).

[4] Housing construction averaged at 617,000 units per year between 1992 and 1997. However, only 306,000 units were built in 1998. New housing construction recovered slowly to 405,000 and 434,000 units in 1999 and 2000, respectively, before it jumped to 530,000 in 2001 and 666,500 in 2002.

Table 2
Growth and volatility of housing investment: 1970–2002

	Private consumption	Investment	Housing	Non-housing	Construction	GDP
Average annual growth rate	6.43	9.47	9.10	9.90	8.20	7.30
Standard deviation of growth rate	3.99	11.43	20.15	11.56	11.04	3.82
CV	0.62	0.83	2.21	1.17	1.35	0.52
Share of GDP	57.0	27.2	5.6	21.5	17.2	100

2.2. Determinants of housing investment: Burns–Grebler hypothesis

In addition to economic factors, government policies have been a major factor in determining the level of housing investments in Korea. During the early stage of development, government viewed housing as producing a lower return compared with manufacturing and export industries, and hence discouraged the nation's scarce capital from flowing into housing. Government has controlled large scale land development and consequently the volume of new housing supply. Government also suppressed 'speculative' demand for housing through punitive taxation and restrictions on transactions to keep demand within supply limit. It was not until 1988 when government realized that the problem of "housing shortages" could not be resolved without a massive increase in supply. Such a change in housing policy materialized in a drive to build two million new dwellings between 1989 and 1992. As a result, annual housing production increased by more than 100% from 227,000 for 1977–1986 period to 550,000 during the next 10 years.

The upshot is that the level of residential investment in Korea has been a policy variable to a large extent. For this reason, it would be interesting to see how well the evolution and the fluctuations of housing investment in Korea can be explained by the well-known relationship first posited by Burns and Grebler (1977) in the context of countries with a more market-based housing sector. Using cross-sectional and time-series data, they show that the share of housing investment as a percentage of total output (SHTO) is linked to the stage of development in a nonlinear manner. They find that the share starts low at low income levels, increases as per capita income rises, reaches a peak and starts falling at high income levels. Such an inverted-U shaped relationship is found to exist in cross-sectional data. A subsequent study by the World Bank (1993, p. 102) shows that SHTO averages at 2% for least developed economies, peaks at 8% among middle-income countries, and then drops to 3–5% in developed countries.

Early analyses of Korean data generated somewhat different results.[5] Renaud (1980) estimates SHTO equations using time-series data from 1957 through 1976

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[5] One possible explanation might be credit rationing. As we explain in Section 3, housing finance has been underdeveloped until very recently, and government intentionally discouraged capital from being used to finance residential investment. See Jaffee and Stiglitz (1990, pp. 880–882 and the references) for a discussion of credit rationing in the US context and Renaud (1989) for a discussion of the Korean case.

and finds that the quadratic form performs poorly, while the reciprocal transformation or logarithm-inverse transformation fit the data quite well. Kim and Suh (1991) also report that the 1970–1986 data could not be explained by the quadratic function. It would be interesting to see whether the data extending to the more recent years reveals a different pattern. Fig. 1 illustrates the relationship between the real per capita income (Gross National Income: GNI in 10,000 won in 1995 prices) and SHTO since 1970. Each point in the diagram represents a particular year starting from 1970, connected to the point indicating the previous year. During this period, per capita real income increased each year except in 1980 and in 1998, while SHTO took a big jump in 1988–1989 as a result of the government drive to build two million new dwellings. SHTO remained quite high until the outbreak of the economic crisis in late 1997. The graph appears to be somewhat close to an inverted-U shape.

To find the exact relationship between housing investment and income, the share of residential investment as a percentage of GDP was regressed on per capita real GNP(Y) and its square term (YSQ). The estimated OLS regression is:

$$\text{SHTO} = 0.6752 + 0.1945 \ Y - 1.49 \times 10^{-5} \ \text{YSQ}$$
$$(0.0035) \quad (2.90 \times 10^{-6})$$

Adjusted $R^2 = 0.49, \ D - W = 0.69.$

The result is consistent with an inverted-U shaped relationship, but the Durbin–Watson statistic suggests that error terms are serially correlated. They are found to follow an autoregressive process of order 2. Therefore, two autoregressive terms (AR1 and AR2) are added as explanatory variables. Finally, real interest rate is included as an explanatory variable since it is expected to discourage housing investment (World Bank, 1993, p. 103). The estimation result is:
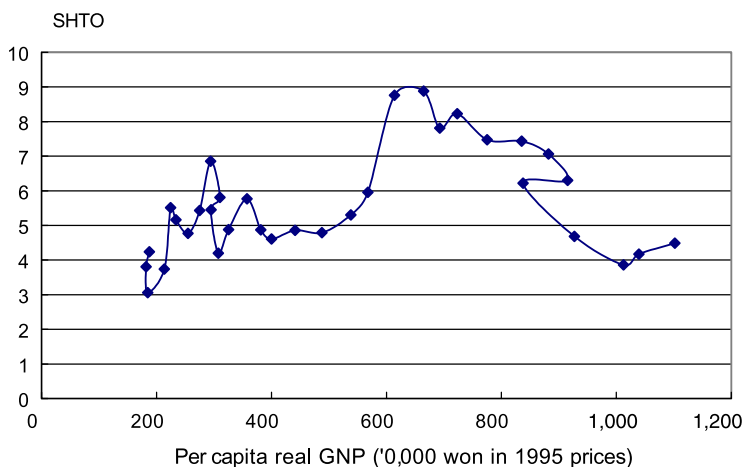

Fig. 1. Per capita real income vs SHTO: 1970–2002.

$$\text{SHTO} = 1.0072 + 0.0206\ \text{Y} - 1.51 \times 10^{-5}\ \text{YSQ} - 0.1301\ \text{RINT} + 0.9704\ \text{AR(1)} - 0.4414\ \text{AR(2)}$$
$$\quad (0.0068) \quad (5.06 \times 10^{-6}) \qquad (0.0416) \qquad (0.2145) \qquad (0.2176)$$

Adjusted $R^2 = 0.750,\ D - W = 1.885.$

The estimated coefficients of the explanatory variables had the expected signs and were statistically significant. The two autoregressive terms were also significant. The adjusted R^2 was 0.75. Therefore, the Korean data appears to be consistent with the Burns–Grebler hypothesis.

2.3. Has Korea under-invested in housing?

Another interesting question concerns optimal allocation of resources to the housing sector. In US, favorable tax treatments of home ownership have resulted in over-investment in housing. Using a two-sector model of capital allocation, Mills (1987) demonstrates that the social rate of return to housing is much lower than that to non-housing capital, implying that too much capital has been channeled to housing. A more recent study of 1975–1995 data by Taylor (1998) finds no evidence that the social rate of return to housing narrowed relative to that for non-housing capital and education despite the reduction in tax benefits to owner-occupied housing following the Tax Reform Act of 1986.

On the contrary, it is believed that Korea has under-invested in housing due to government policies, discouraging resource allocation to housing at least until the late 1980s. Kim and Suh (1991) test this hypothesis by applying the Mills' model to 1970–1986 annual data and show that too little capital has been allocated to housing. The analysis has been extended to 1995 to capture the impact of the drive to build two million new dwelling units. The gap in the rate of return for housing and that for non-housing capital is found to have narrowed but has not been completely eliminated.

2.4. Housing investment and macroeconomic fluctuations

A related issue concerns the role of residential investment as a contributor to changes in GDP. Green (1997) performs a series of Granger causality tests to see whether residential and non-residential investment Granger cause GDP, and whether GDP Granger causes each of the two types of investments. He shows that residential investment Granger causes GDP, but nor vice versa, while non-residential investment does not cause, but is caused by GDP. These results suggest that housing leads the business cycle in US. Green concludes that policies to correct "over-investment" in housing to improve resource allocation in the long run context should be pursued with caution because doing so would have undesirable consequences in the short run.

A similar Granger causality test is carried out using 1970–2002 quarterly Korean data. The lag length is determined based on the Akaike Information Criteria and Schwartz Criteria. The result summarized in Table 3 suggests housing is not a driver

Table 3
Causation between investment and GDP: 1970–2002

Related pair of variables	Null hypothesis	Lag	*P* value
GDP vs residential investment (RI)	RI $\nRightarrow$ GDP	7	0.6059
	GDP $\nRightarrow$ RI	5	0.0003
GDP vs non-residential investment (NRI)	NRI $\nRightarrow$ GDP	9	0.0000
	GDP $\nRightarrow$ NRI	3	0.0000

Note. Quarterly data, lag criterion = AIC, SC.

of GDP but a follower of fluctuations of the wider economy. Non-residential invest-ment is found to be both a driver and a follower of macroeconomic fluctuations. These results are different from those reported by Green (1997). One possible expla-nation of the passive role of housing investment as a follower of the macroeconomy is that government has used residential investment to counter business fluctuations.

2.5. Housing stock and household wealth

Housing stock evolves from cumulated investment in housing over time. Thanks to the massive investment since the late 1980s, Korea's housing stock in-creased remarkably. The total number of dwellings was 6.1 million as of 1985 but this figure jumped to 9.6 million by 1995 and to 11.5 million by 2000. As a result, the number of dwellings per 1000 persons rose from 155 to 249 during the 15-year period.[6]

Residential housing constitutes a large portion of household wealth in Korea. According to a recent analysis of household panel data reveals that the value of pri-mary residence (in the case of owner-occupants) and key money deposit (in the case of renters) has been 4.9 times as large as financial assets and represented 83% of total household wealth in 2001 (Yoo, 2004).[7] Fig. 2 and Table 4 present the trend of esti-mated aggregate market value of apartments (equivalent to condominiums in US) in Seoul since 1988.[8] The total market capitalization was 33 trillion won in 1988, which was equal to 103% of the city's gross regional domestic product (GRDP). The mar-ket capitalization increased by 52% in 1989 and by 66% in 1990 to reach 83.7 trillion won in 1990, representing 187% of GRDP. As a result of the large increase in new

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[6] It is still quite low compared with Japan (399 in 1998), US (419 in 1995), UK (417 in 2000), France (490 in 2000), and Germany (445 in 2000). See MOCT (2004, p. 389).

[7] This data does not contain information on non-financial assets other than residential housing. Primary residence represented 27.1% of total wealth of US households in 2001 (Aizcorbe et al., 2003). This figure is equivalent to 40.4% of total wealth defined as the sum of financial assets and the value of primary residence.

[8] The data are compiled by a private real estate information service company based on a regular survey of real estate agents and cover virtually all apartments in Seoul. No data on the value of single family houses are available on a regular basis. At the end of 2001, there were 1.01 million apartments in Seoul, nearly half the total housing stock which was 2.14 million.
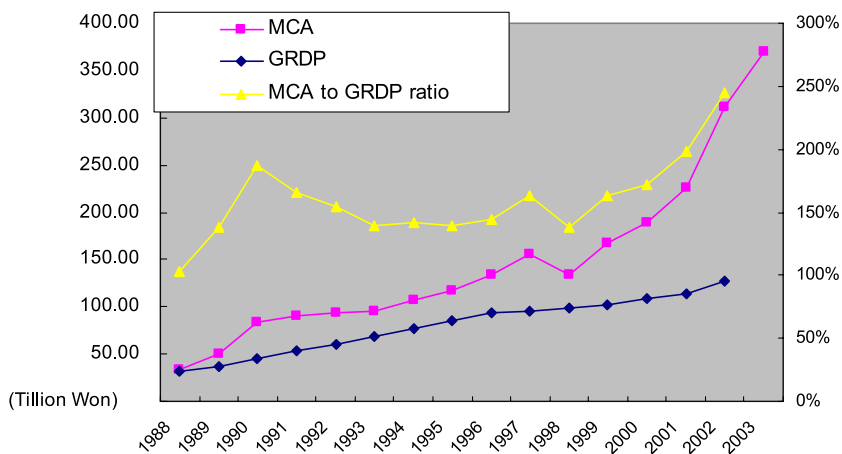
Fig. 2. Market capitalization of apartments vs Gross Regional Domestic Product in Seoul (Trillion won, %). Source: Computed from data provided by Neonet.

Table 4
Market valuation of apartments and GRDP of Seoul vs stock market capitalization

	Total number of apartments	Total market capitalization of apartments (billion won)	Average price per apartment (10,000 won)	Total market capitalization of Korea stock exchange (billion won)	GRDP (billion won)
1988	396,163	32,996	8,329	64,543	32,048
1989	428,083	50,401	11,774	95,476	36,609
1990	448,628	83,660	18,648	79,019	44,853
1991	487,480	90,048	18,472	73,117	54,229
1992	538,096	92,943	17,273	84,711	60,304
1993	585,524	95,315	16,279	112,665	68,643
1994	624,939	107,690	17,232	151,217	76,224
1995	673,721	117,556	17,449	141,151	84,599
1996	711,453	134,439	18,896	117,369	93,272
1997	758,384	155,008	20,439	70,988	94,695
1998	815,798	134,686	16,510	137,798	97,947
1999	891,155	167,291	18,772	349,503	102,460
2000	966,938	188,470	19,491	188,041	109,306
2001	1,009,843	226,522	22,474	255,850	114,362
2002	1,043,584	311,044	29,805	258,680	127,174
2003	1,070,821	369,391	34,496	344,733	n.a.
2003/1988	2.70	11.20	4.14	5.34	

Source: Estimated with data from Neonet. Stock market valuation is from the Korea Stock Exchange, and GRDP data are from the National Statistics Office.

construction that started in 1989, the average price per apartment stabilized since 1992 and the market capitalization increased at a moderate pace until 1997 while the stock of apartments increased substantially. Then, the total market valuation

of apartments dropped by 20 trillion won in 1998 following the outbreak of the economic crisis in November 1997, but its pre-crisis level was regained within the next year or so. Apartment prices then started rising in 2000 and the pace of appreciation accelerated in 2002, during which year the total valuation of apartments in Seoul gained a whopping 84 trillion won (about 70 billion US dollars). The market capitalization as of December 2003 is 369 trillion won (about 320 billion US dollars), which is more than ten times as large as that of 1988. The increase in housing wealth can be attributed to increases in price and quantity. During the last 15-year period, the price per pyong (3.3 square meters or 37 square feet) rose by 4.1 times, and the stock of apartments increased by a factor of 2.7. Finally, the value of apartment wealth in Seoul is larger than total market valuation of stocks listed on the Korea Stock Exchange, a complete turnaround in relative size from 1988.

3. Housing finance, consumer credit, and housing price

3.1. Evolution of the housing finance system

Market-based housing finance is a recent phenomenon in Korea. The primary mortgage market used to be dominated by the National Housing Fund (NHF) providing below market loans to low- to moderate-income households, and the Korea Housing Bank (KHB) serving a somewhat higher income clientele with amortizing mortgages of 10–15 years in maturity. However, there was a substantial amount of credit rationing in their operation. A ceiling on loan amount per household was enforced so that the loan-to-value ratio was typically below 30%. Only new houses were eligible for loans, and households with particular income or job profile were given priority. However, the market has changed significantly with financial deregulation in the early 1990s and privatization of KHB in 1997. The size of the primary market has increased substantially while more diverse products have been marketed and loan-to-value ratio has increased as competition among financial institutions intensified.

The secondary mortgage market was created as the MBS Company Act was legislated in 1999 and the Korea Mortgage Corporation (KoMoCo) was established in December 1999. KoMoCo was merged with the Housing Loans Guaranty Fund to form Korea Housing Finance Corporation (KHFC) as a state-owned financial institution in March 2004. KHFC purchases long-term fixed rate mortgages from commercial banks following underwriting guidelines[9] and packages mortgage-backed securities (MBS).

In addition to the formal housing finance system, Korea has the *Chonsei* housing finance mechanism. It emerged naturally from the environment of high inflation, financial repression, and housing shortages. Under this arrangement, the tenant gives the landlord a lump sum deposit in lieu of monthly rental payments. The deposit is fully refunded at the end of the lease, although complications can arise in

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[9] Maturity is up to 20 years and the maximum LTV is 70%.

weak rental markets in which the landlord cannot find the new tenant in time for the departure of the exiting tenant. In some cases, the chonsei deposit serves as a financing source for the purchase of a house to let by the would-be landlord.[10]

Total chonsei deposits in 1997 were estimated to be 107.8 trillion won, just about twice as large as the total mortgage loans outstanding of 64 trillion won (Kim and Suh, 2002, p. 231). A more recent estimate suggests that total chonsei claims on apartments alone are 63.4 trillion won in mid-2001 compared with housing loans outstanding of 54 trillion won (Lee et al., 2001). Chonsei has become less important as a financing mechanism in recent years as monthly rental contracts and mortgage financing have become more popular than in the past.[11]

3.2. Key indicators of housing finance

Table 5 presents key indicators of the organized mortgage market. First, the primary market expanded remarkably in recent years. The outstanding balance of mortgage loans amounted to 11.7% of GDP in 1997 but the share rose to 13.4% by 2001. Since the 2000 and 2001 data do not include the loans originated and held by insurance companies and mortgage companies, the reported data under-estimate the size of the mortgage market.[12] Nevertheless, the current level is much lower than those of the developed economies.[13] Second, the vast majority of housing loans are short-term bullet mortgages with 3 years in maturity. The short-term mortgages have become a norm in the market since Kookmin Bank (KB), the predominant lender in the primary market, merged the former Korea Housing Bank that had been privatized in 1997. In 2002, three-quarters of new originations have had maturities of less than 3 years. The concern about the instability that might be caused by fluctuations in short-term interest rate has been a major rationale for establishing the Korea Housing Finance Corporation.

Third, the spread between the mortgage rate and the yield on 3-year government bonds was negative in 1997, rose to plus 6.14% in 1998 following the economic crisis, and then narrowed to 1–2% points since 1999. The reversal of the sign of the spread was a major factor that made the secondary mortgage market a reality. Finally, the secondary market is now up and running, although at a moderate scale. KoMoCo issued a total of 3.2 trillion won in MBS between 2000 and 2002, and additional 0.6 trillion won in ABS was issued under the separate Asset-Backed Securities

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[10] See Kim (1990) or Renaud (1989) for a discussion of Chonsei.

[11] According to the population and housing census of 2000, 41% of the housing stock in urban areas is owner-occupied, 41% rented on a chonsei contract, and 16% rented on a monthly rental contract with or without a separate key money deposit. But chonsei represents about 60% of new rental contracts in Seoul.

[12] Statistics on housing finance that are comparable with those prior to 2001 are not available since 2002. The Bank of Korea publishes data on only the housing loans made to consumers but not those made to developers. Many lenders under-report housing loans as they declare loans with housing collateral as consumer loans. This makes it difficult to get a full picture of the size of the primary mortgage market. Lee (2003) estimates the mortgage loans outstanding in 2001 to be 139 trillion won, almost twice as large as the available figure reported in the table. Of course, even this figure under-estimates the size of the housing finance sector because it does not include the informal chonsei market.

[13] The average for EU in 2001 is 39% (European Central Bank, 2003, p. 9).

Table 5
Key indicators of primary and secondary mortgage markets (Trillion won (%))

Indicator	1997	1998	1999	2000	2001	2002
Outstanding balance (A)	53.0	55.5	61.3	67.6	72.9	n.a.
New originations (B)	13.4	12.1	17.1	21.4	29.7	n.a.
GDP (C)	453.3	444.4	482.7	522.0	545.0	596.4
A/C	11.7	12.5	12.7	13.0	13.4	n.a.
B/C	3.0	2.7	3.5	4.1	5.4	n.a.
Interest spread against 3-year government bond	−1.43	6.14	1.17	2.81	1.09	1.41
Share of KB loans with maturity of 3 years or less	n.a	41.0	55.4	62.6	70.8	75.6
MBS issues (D)	—	—	—	1.38	0.84	0.95
D/B	—	—	—	6.4	2.8	n.a.

Source: Adapted from Lee (2003, pp. 24–27).

(ABS) Law. However, the volume of MBS issued represents a small fraction of new mortgage originations, 3–6% for 2001 and 2002.[14]

3.3. Recent credit expansion and housing price hike

Record-low interest rates and the rapid expansion of consumer credit since 2000 are thought to have been a major contributing factor to soaring apartment prices in Seoul over the last few years. The average interest rate on consumer loans was 10.9% in 1999, but it fell to 8.2% in 2001 and further to 6.3% in 2003. The outstanding balance of consumer loans, including housing loans but excluding credit card debt, was 192 trillion won at the end of 1999. The balance doubled within the next 3 years to 391 trillion won by the 2002 year-end, and stood at 421 trillion at the end of 2003. Such a drastic increase in consumer credit represents a clear shift in banks' lending policy. As of 1999, consumer credit accounted for 31.6% of the loan portfolio of banks while the remaining 68.4% was loans to corporations. The share of consumer credit increased to 44.1% by 2001 and to 47.6% in 2002. Important reasons for the shift are the corporate demand for funds shrank due to the sluggish economy and banks became more cautious about risks associated with corporate lending.

The rapid expansion of consumer credit is likely to have had a strong impact on the housing market. A survey by the Bank of Korea indicates that 68% of consumer loans were collateralized by houses and about 56% of the loans were used to finance home purchases in 2002. On the other hand, a strong housing market implies an increase in the value of potential collateral for consumer credit. Fig. 3 illustrates a close linkage between the pace of increase in consumer loans (CL) and that of market capitalization of apartments (MCA) in Seoul since 1996. Fig. 4 plots the rate of change in CL against that of MCA, suggesting a strong positive correlation between the two variables. The simple correlation coefficient is 0.73.[15]

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[14] MBS issuance in 2003 was only 0.3 trillion won. Secondary market activity picked up again with the creation of the Korea Housing Finance Corporation (KHFC) in 2004.

[15] For a theoretical analysis of the effects of credit expansion on the housing market in the presence of collateral constraints, see Ortalo-Magne and Rady (1999).
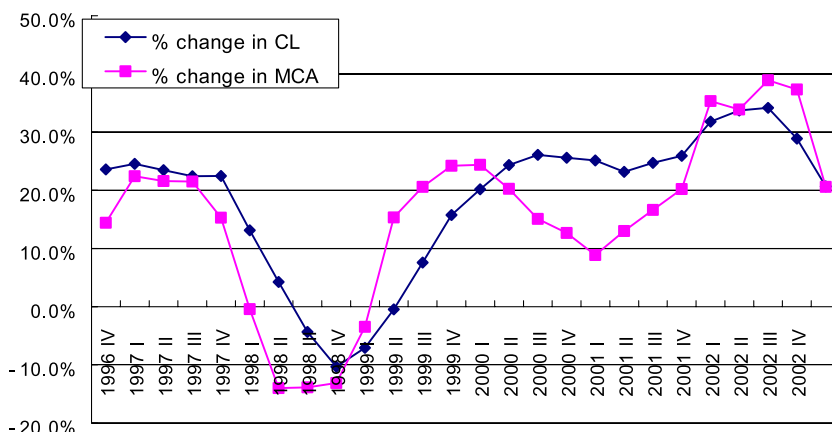
Fig. 3. Percentage changes in consumer loans and market capitalization of apartments in Seoul: 1996–2003.
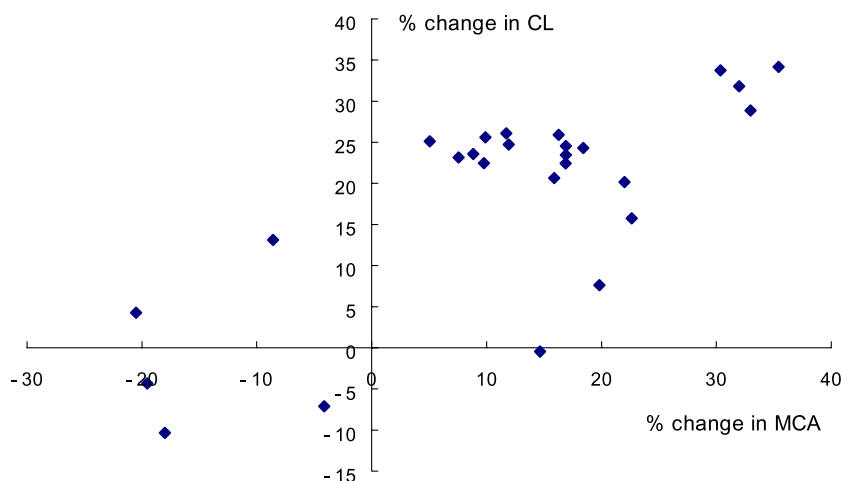
Fig. 4. Correlation between percentage increases in consumer loans and those in market capitalization of apartments in Seoul: 1996–2003.

A set of Granger causality tests designed to establish the causality between consumer credit and the price of housing is reported in Table 6. Three measures of housing price were considered: average price per pyong (APP) of apartment in Seoul, urban housing price index (HP), and market capitalization of apartments in Seoul (MCA). The quarter-to-quarter rates of change in these price variables are paired with those of consumer loans (CL) and housing loans (HL) with a one-quarter lag.[16] The test results reveal a pattern of two-way causality between changes in hous-

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[16] The data used in the causality test are stationary at a 5% significance level.

Table 6
Granger causality between credit expansion and housing price: 1996–2002

Related pair of variables	Null hypothesis	P value
% change of consumer loans (DCL) vs % change of market cap of apartments in Seoul (DMCA)	DCL $\nRightarrow$ DMCA	0.1265
	DMCA $\nRightarrow$ DCL	0.0031
% change of consumer loans (DCL) vs % change of housing price index (DHP)	DDCL $\nRightarrow$ DHP	0.1560
	DHP $\nRightarrow$ DCL	0.0618
% change of housing loans (DHL) vs % change of market cap of apartments in Seoul (DMCA)	DHL $\nRightarrow$ DMCA	0.0008
	DMCA $\nRightarrow$ DHL	0.0007
% change of housing loans (DHL) vs % change of housing price index (DHP)	DHL $\nRightarrow$ DHP	0.0045
	DHP $\nRightarrow$ DHL	0.0214

Note. Quarterly data, lag = 1.

ing loans and housing price, whereas the causation between more broadly defined consumer loans and housing price is less clear.

4. Housing price, consumer spending, and inflation

4.1. Housing price trends

Housing prices fluctuate in response to changes in macroeconomic variables, such as income and interest rates, as well as prices of inputs, such as land and construction materials. Fig. 5 illustrates the rates of changes in house prices, land price, and nominal GDP since 1986. House price and land price tend to move together. This is not surprising because land is the most important factor of housing production and the supply of developable land is tightly controlled by government in Korea (see Kim, 1993 and Renaud, 1989). Fluctuations in house prices have become very closely correlated with changing nominal GDP since the outbreak of the Asian economic crisis. Housing price dropped sharply in 1998 and bounced back in 1999 in tandem with the overall economic recovery.[17] The latest house price boom between 2001 and 2003 exceeded the pace of GDP growth by a wide margin. This raises the question of whether there is a price bubble in the housing market.

4.2. Testing for house price bubbles

Although the house price bubbles literature is large, there is not a universally accepted standard to define and identify "bubbles." A common-sense definition is a

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[17] Kim (2000) argues that the housing sector suffered from the economic crisis instead of being a cause of the crisis. Housing prices started declining in absolute terms in 1991, following the massive increase in new supply, long before the outbreak of the economic crisis.
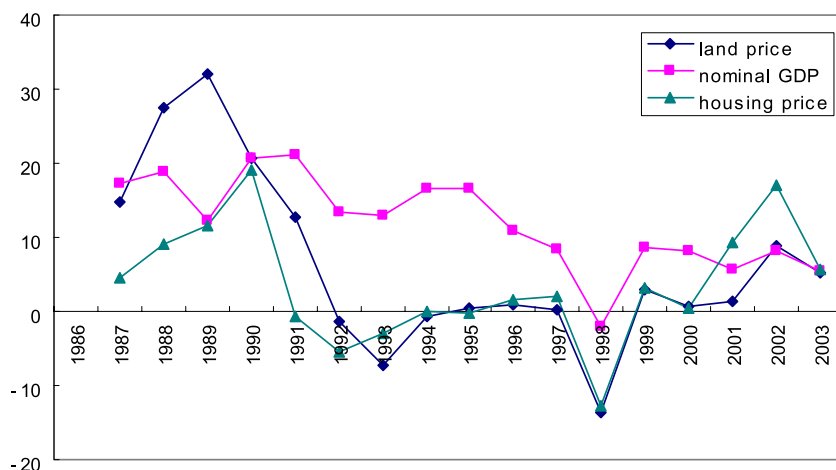
Fig. 5. Housing price, land price, and nominal GDP, 1986–2003 (% rate of change).

Table 7
Youngblood test of house price bubble in Seoul

		Mean	Standard deviation	CV	Threshold	Period exceeding the threshold
Seoul	All apartments	7.296	2.168	0.297	9.465	1989.1/4 1990.1/4–1991.4/4
	New ones	7.237	2.469	0.341	9.707	1989.1/4–1991.4/4
	To be redeveloped	7.814	1.789	0.229	9.603	1990.1/4–1991.4/4
Gangnam submarket	All apartments	10.368	2.725	0.263	13.093	1990.1/4–1991.4/4 2003.2/4
	New ones	11.386	3.487	0.307	14.843	1990.1/4–1992.1/4
	To be redeveloped	7.847	1.815	0.231	9.662	1990.1/4–1991.4/4 2002.4/4–2003.2/4

bubble exists when the movement of house price is too large to be attributable to market fundamentals. But there are inherent difficulties in identifying the market fundamentals, and the test for a bubble is a joint test of specification and the existence of a bubble.

A simple and intuitive approach is to define a bubble as a substantial deviation from long-term average. Youngblood (2003) uses the long-run average of the ratio between the median price of existing houses and per capita personal income (PIR) as a proxy for the long-run equilibrium relationship defining housing price. He concludes that a bubble exists during a particular period if the observed PIR exceeds the threshold defined as the long-run average PIR plus one standard deviation, and the coefficient of variation is at least 0.10.

Table 7 summarizes the results of the tests for house price bubbles using the quarterly Korean data from 1988:Q4 till 2003:Q4.[18] Applying the Youngblood criteria to the whole city identifies the 1989–1991 period as having had a bubble, but the latest house price "boom" does not qualify as a bubble.[19] However, a bubble is found since the second quarter of 2002 in Seoul's prime submarket (Gangnam), especially among those units that had become eligible for redevelopment at higher densities. But this test is not well grounded to theory, and much of the price increase in this submarket may be explained by local demand, supply and regulatory factors.

Another popular criterion for identifying a house price bubble is the house price-to-rent ratio, which is similar to the stock market price-earnings ratio, and hence called House PER (see Leamer, 2002). The intuition is that the price of a house as an asset should be based on the rents it commands. If the price-to-rent ratio deviates substantially from its long-run average, a bubble is likely to be present. In Korea, monthly rentals are much less popular than chonsei, and implicit rents on chonsei should be computed by multiplying the deposit by the implicit interest rate. Data on the interest rates are published by KB (Kookmin Bank), but the time series began only in September 2001. Since then, the interest rate dropped from 1.10% per month to 0.89% per month in July 2003. Applying the interest rate to the price of apartments in Seoul suggests that the price-to-rent ratio went up from 12.5 to 17.8 over the past 20 months. One might interpret this as evidence of a bubble, but the rise House PER might be explained by a fall in real interest rate and the increase in optimistic expectations about house price appreciation in the future.[20]

Such optimistic expectations can be propagated by mob psychology and media coverage. Case et al. (2003a,b) document the behavior of home-buyers in several cities in the US, and demonstrate that "excessive optimism" plays an important role in some markets. Although no such systematic survey has been conducted in Korea, media coverage of recent apartment price hikes in Seoul might have influenced the expectations of house price by some home-buyers. Table 8 presents the counts of articles and editorials published in 13 newspapers with national circulation that contain key words such as "house price," "house price in the Gangnam submarket of Seoul," "real estate speculation," and "real estate price bubble." The last row presents the rate of increase in apartment price in Seoul. Obviously, media coverage increased sharply as housing price appreciation accelerated in 2001 and 2002. The media appears to have paid much more attention to the house price increase in the prime sub-market (Gangnam) or bubble than the overall housing price appreciation. This is consistent with the public perception that the price run-up in the most

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[18] PIR is calculated as the ratio between the average apartment price and the average household income.

[19] See Kim and Suh (1993) for a test of bubble using a different method.

[20] Berson (2003) argues that the appropriate comparison should be cash flows associated with renting and owning. In US, mortgage payments may have come down due to a drop in the interest rate so that the relative attractiveness of two types of tenure remains stable. Also, the decline in the rent to price ratio may reflect the change in the cap rate.

Table 8
Media coverage of recent house price hike

Key word	2000	2001	2002	2003
House price	571	716	2839	3443
House price in the Gangnam submarket of Seoul	98	174	1014	1671
Real estate speculation	112	122	717	803
Real estate price bubble	78	159	790	796
Rate of change in apartment price in Seoul (%)	4.3	19.3	30.8	11.1

Note. The entries represent the number of articles carrying the key words published in 13 newspapers with nationwide circulation. Source: Search from the website, www.kinds.or.kr.

expensive sub-market spills over to other sub-markets and that a speculative bubble exists in the Seoul's apartment price.

4.3. Housing price and consumer spending

The house price wealth effect on consumption constitutes an alleged important nexus between housing and aggregate demand, but the exact mechanism and the magnitude of this effect are controversial. Miles (1994) argues that higher real house prices benefit those who want to "trade down" but hurt the first-time homebuyers and those who want to "trade up." Therefore, the aggregate wealth impact on consumption is likely to be small unless domestic residents sell their houses to foreigners to cash out the capital gains. As for the differential impact of the housing wealth effect on consumption, some or all of the increased consumption by current home owners could be offset by increased savings of renters. But a recent analysis of a panel data of US and Western countries by Case et al. (2003a,b) suggests that higher housing prices reduce the savings of renters. The study finds strong evidence of the housing wealth effect; but the impact of stock market wealth is negligible.

A similar relationship has been investigated using Korean data. A linear and log-linear consumption functions has been estimated using 1988.4/4–2003.2/4 quarterly data. In both specifications real consumption was regressed on real gross national income (GNI), total market value of apartments in Seoul deflated by the Consumer Price Index (RMCA), and the stock market valuation in constant prices (RSTOCK). In the linear model, consumption is found to be co-integrated with the three explanatory variables, with both housing wealth and stock market wealth having a positive impact on consumption. The normalized co-integration equation is

$$RCON = 0.626 \times RGNI + 7.97E + 05 \times RMCA + 0.004 \times RSTOCK - 12246.60 \times constant.$$
$$\quad (0.032) \qquad\quad (8.8E - 0.6) \qquad\qquad (0.0007)$$

Standard errors are in parentheses.

The normalized co-integration equation for the double-log specification is

$$LRC = 1.019 \times LRGNI + 0.229 \times LRMCA + 0.071 \times LRSTOCK - 5.982 \times constant.$$
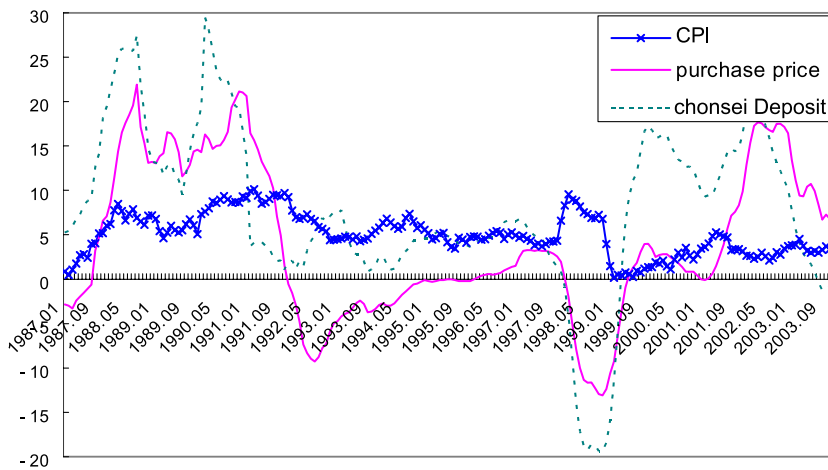$$\quad (0.034) \qquad\qquad (0.024) \qquad\qquad (0.015)$$

Fig. 6. Housing price and inflation: 1987.1–2003.9.

The coefficients of the explanatory variables in the double-log specification represent constant elasticities. The elasticity of consumption with respect to housing wealth is about three times as large as that of stock market wealth, which is consistent with Case et al. (2003a,b).[21]

4.4. Housing price and inflation

The supply of housing is fixed in the short run. Therefore, an increase in housing demand driven by macroeconomics leads to an increase in housing price. House price can be a leading indicator of inflation because supply is more responsive to demand in other goods markets. Increases in housing price also affect workers' demand for wages. For these reasons, housing price increases are claimed to provide useful information in predicting inflation.

Fig. 6 illustrates the trend in inflation of the Consumer Price Index and those of housing purchase price index and chonsei deposit index, where inflation is measured in month-over-month rate of change. As a general rule, CPI inflation appears to trace closely the inflation of the purchase price of housing.[22] However, causality is not obvious.

Table 9 summarizes the results of Granger causality tests between housing price and CPI inflation. Several lag structures were considered; the results reported are

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[21] The estimated wealth effect is much larger than reported estimates for UK and Japan which are 0.06–0.15 and 0.06–0.10, respectively (see OECD (2000, p. 178)). Also, the reason for the dominance of housing wealth effect over stock wealth effect is not entirely obvious in the Korean context, although the home equity loan has become much easier to obtain.

[22] Inflationary expectation can affect the asset demand for housing and hence housing price. It was found that the housing price index is cointegrated with inflation (positive sign) and the real interest rate (negative sign).

Table 9
Granger causality between housing price and inflation 1986-2003

Related pair of variables	Null hypothesis	*P* value
% change of purchase price index (DHPI) vs	DHPI $\nRightarrow$ DCPI	0.0093
% change of consumer price index (DCPI)	DCPI $\nRightarrow$ DHPI	1.1×10^{-5}
% change of chonsei deposit index (DCDI) vs	DCDI $\nRightarrow$ DCPI	0.0026
% change of consumer price index (DCPI)	DCPI $\nRightarrow$ DCDI	3.6×10^{-5}

Note. Month-to-month rate of change, lag = 1.

based on a one-month lag. Two housing price indexes were analyzed: the purchase price index (HPI) and the chonsei deposit index (CDI) published monthly by KB. The test statistics suggest that the causality runs in both directions between house price increases and CPI inflation. In other words, not only does house price index provide useful information on inflation in the next month, inflation tends to lead to higher housing prices with the same lag.

5. Policy implications and concluding remarks

This paper investigates the nexus between housing and the Korean economy. It provides an overview of relevant institutions, presents data on selected aspects of the linkages, and conducts an empirical analysis of several key relationships. Our analysis has focused on aggregate demand (i.e., housing investment, consumption, and inflation), while the impact of housing market performance on aggregate supply has not been explored.

Housing price is affected by both housing market and macroeconomic variables. Macroeconomic factors, such as the falling interest rate and rapid expansion of consumer credit, are responsible for the recent increases in overall housing price in Seoul. Nevertheless, the rate of price appreciation varies substantially across sub-markets within the city, suggesting the importance of factors internal to the specific sub-markets.[23] As income grows and demography changes, demand for housing becomes more diverse and complicated. It is important that government secure an environment in which supply can respond to changing demand in a flexible manner.

The recent house price appreciation is not unique to Korea, but policy response by the Korean government has been unusual. Although many cities in the US and European countries have experienced a similar price run-up, none of these governments staged a comprehensive policy intervention to stabilize housing prices, let alone those in the most expensive neighborhoods. Most of government intervention in Korea has aimed at curbing speculative demand through punitive taxation on cap-

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[23] The volatility of housing prices is closely related with the responsiveness of supply to changes in demand. The less elastic the supply is, the larger is the price volatility. (Malpezzi and Wachter, 2002).

Table 10
Profile of housing loans originated, 1999–2003

	1999	2000	2001	2002	2003
Percentage of households with access to loans	50.8	55.6	62.5	64.2	n.a.
Average loan amount ('0,000 won)	3470	3561	3873	4854	5258
Loan-to-value ratio	30.4	28.5	31.6	32.1	32.4
Loans with LTV >50%	9.6	6.9	9.9	10.7	11.4

Source: KB (2003).

ital gains, as well as restrictions on housing transactions. However, it can be demonstrated that raising property taxation will lower asset price of housing only at the cost of a smaller housing stock and hence higher rents in the long run (see Colwell, 2002. Measures to improve the performance of the supply side should cause both lower housing prices and a larger housing stock. Although the former might be more popular than the latter, the latter can better serve the ultimate policy goal of improving the overall housing consumption.

An alleged reason for government intervention to reduce Korean house price fluctuation is the fear that an abrupt ''bust'' of the house price bubble can seriously damage the financial system and eventually the whole economy, as happened in Japan in the early 1990s. The risks of a banking collapse because of a possible fall in house prices seem remote in Korea because of the low loan-to-value ratio of mortgages. Table 10 shows that the average LTV on consumer loans originated by KB between 1999 and 2003 was slightly over 30% and only about 10% of the loans had a LTV exceeding 50%.[24] Although more households have access to consumer credit and take larger loans than in the past, the lending institutions are unlikely to suffer heavily from a moderate fall in housing prices. An abrupt rise in the interest rate may jeopardize the debt-carrying capacity of borrowers, and might generate a sudden fall in housing prices, thereby reducing aggregate demand.

Acknowledgments

References

Aizcorbe, A.M., Kennickell, A.B., Moore, K.B., 2003. Recent changes in U.S. family finances: evidence from the 1998 and 2001 survey of consumer finance. Fed. Reserve Bull. 89, 1–32.

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[24] On average, chonsei deposit is about 50% of the asset value of an apartment in Seoul. This means that those who purchase and let apartmentson a chonsei contract have an extremely high loan-to-value ratio.

Berson, A., 2003. A house price bubble? Not likely, Economic and Mortgage Market Developments, Fannie Mae.

Burns, L., Grebler, L., 1977. The Housing of Nations: Advice and Policy in a Comparative Framework. Macmillan, London.

Case, K., Quigley, J., Shiller, R., 2003a. Comparing wealth effects: the stock market vs the housing market, mimeo.

Case, K., Quigley, J., Shiller, R., 2003b. Home-buyers, housing and the macroeconomy, paper presented at the Reserve Bank of Australia Conference on Asset Prices and Monetary Policy (August).

Colwell, P., 2002. Tweaking the DiPasquale-Wheaton model. J. Housing Econ. 11, 24–39.

European Central Bank, 2003. Structural Factors in the EU Housing Markets.

Green, R.K., 1997. Follow the leader: how changes in residential and non-residential investment predict changes in GDP. Real Estate Econ. 25, 253–270.

Jaffee, D., Stiglitz, J.E., 1990. Credit rationing. In: Friedman, B., Hahn, F.H. (Eds.), Handbook of Monetary Economics, volume II. Elservier Science Publishers, Amsterdam, pp. 837–888.

KB, 2003. Survey of Demand for Housing Loans 2003, Seoul, Korea (in Korean).

Kim, K.-H., 1990. An analysis of inefficiency due to inadequate mortgage financing: The case of Seoul, Korea. J. Urban Econ. 28, 371–390.

Kim, K.-H., 2000. Could a price bubble have caused the Korean economic crisis. In: Mera, K., Renaud, B. (Eds.), Asia's Financial Crisis and the Role of Real Estate. Sharpe Publishers, New York, pp. 99–114.

Kim, K.-H., 1993. Housing prices, affordability and government policy in Korea, J. Real Estate Finance and Econ. 6, 55–72.

Kim, K.-H., Suh, S.H., 1991. An analysis of optimality of housing investment in Korea. Int. Econ. J. 5, 91–104.

Kim, K.-H., Suh, S.H., 1993. Speculation and price bubble in the Korean and Japanese real estate markets. J. Real Estate Finance Econ. 6, 73–88.

Kim, K.-H., Suh, S.H., 2002. Urban Economics, third ed. Hong-Moon Sa, Seoul, in Korean.

Leamer, E., 2002. Bubble trouble? UCLA Anderson Forecast, June 1–11.

Lee, J.-H., 2003. Mortgage securitization in Korea. Housing Finance Int. 18, 24–30.

Lee, S.-Y., Kim, H.-A., Lee, H., 2001. Estimation of the size of private housing finance market and policy recommendations for expansion of housing finance, paper presented at the Special Seminar Commemorating the 10th Anniversary of the Korean Association of Housing Studies, Seoul (in Korean).

Malpezzi, S., Wachter, S., 2002. The role of speculation in real estate cycles, paper presented at the AsRES-AREUEA Joint International Conference, Seoul, Korea.

Miles, D., 1994. Housing, Financial Markets and the Wider Economy. Wiley, New York.

Mills, E.S., 1987. Has the United State overinvested in housing?. AREUEA J. 15, 601–616.

Ministry of Construction and Transportation (MOCT), 2004. Housing Guidebook, Seoul, Korea (in Korean).

OECD, 2000. House prices and economic activity, OECD Economic Outlook, 68.

Ortalo-Magne, F., Rady, S., 1999. Boom in, bust out: young households and the housing price cycle. Europ. Econ. Rev. 43, 755–766.

Pyo, H.-K., 1998. Capital Stock in Korea: 1954–1996. Korea Institute of Public Finance, Seoul, Korea, in Korean.

Renaud, B., 1980. Resource allocation to housing investment: comments and further results. Econ. Devel. Cult. Change 29, 389–399.

Renaud, B., 1989. Compounding financial repression with rigid urban regulations: lessons of Korean housing market. Rev. Urban Reg. Devel. Stud. 1, 3–22.

Renaud, B., 1993. Confronting a distorted housing market: can Korean policies break with the past. In: Krause, L., Park, F-K. (Eds.), Social Issues in Korea: Korean and American Perspective. Korea Development Institute, Seoul, Korea, pp. 291–331.

Taylor, L.L., 1998. Does the United State still overinvest in housing?. Fed. Reserve Bank of Dallas Econ. Rev., Second Quarter, 10–18.

World Bank, 1993. Housing: Enabling the Markets to Work, World Bank, Washington DC.

Yoo, K.W., 2004. Determinants of Korean Household Portfolio Decisions. Bank of Korea, Seoul, Korea, in Korean.

Youngblood, M.D., 2003. Is there a bubble in housing? New evidence from 210 housing markets, GMAC RFC Securities, Residential Funding Securities Corporation.