Population Foreshadows Housing Bubbles and Busts

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Outline

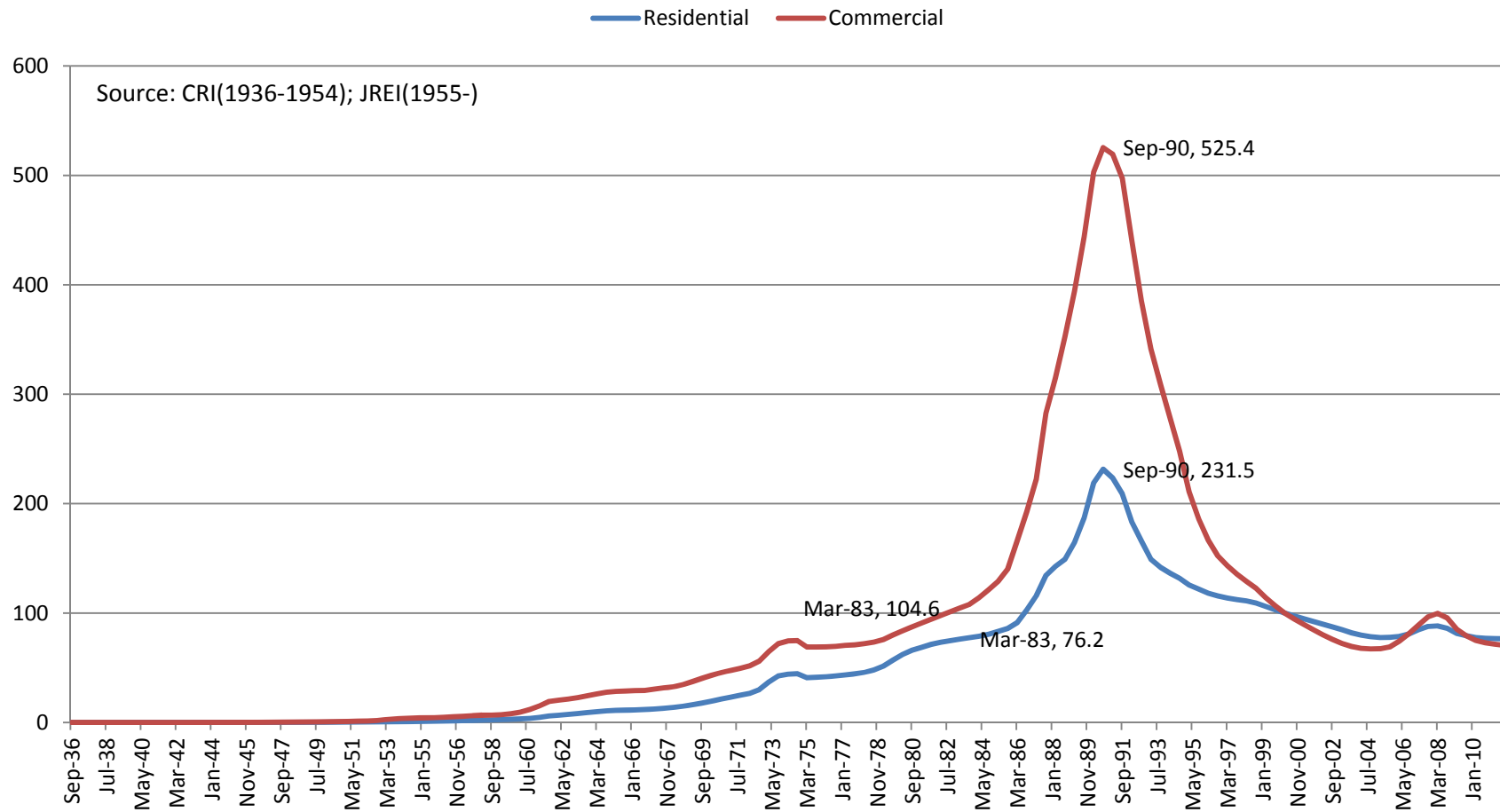1 The Japanese Problem (The 20 Lost YS. and Aging)

2 The Correlation between Housing Bubble and Working Age Population (WAP)

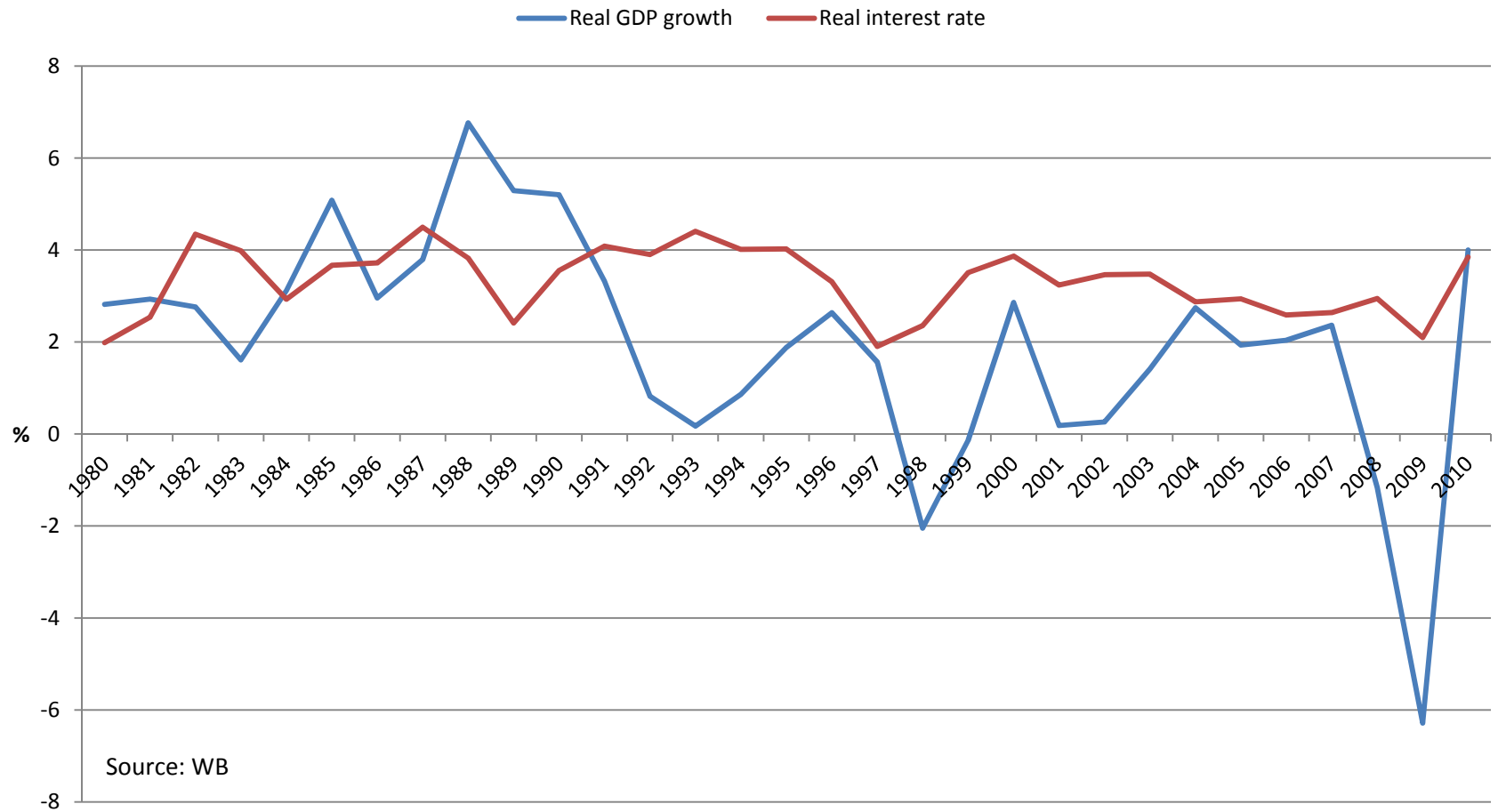3 The Correlation between Housing Price and WAP

4 Discussion

The Japanese Problem (The 20 Lost YS. and Aging)

Figure 1   Magnitude of the Japanese Bubble (Six Large City Areas/Mar 2000=100)
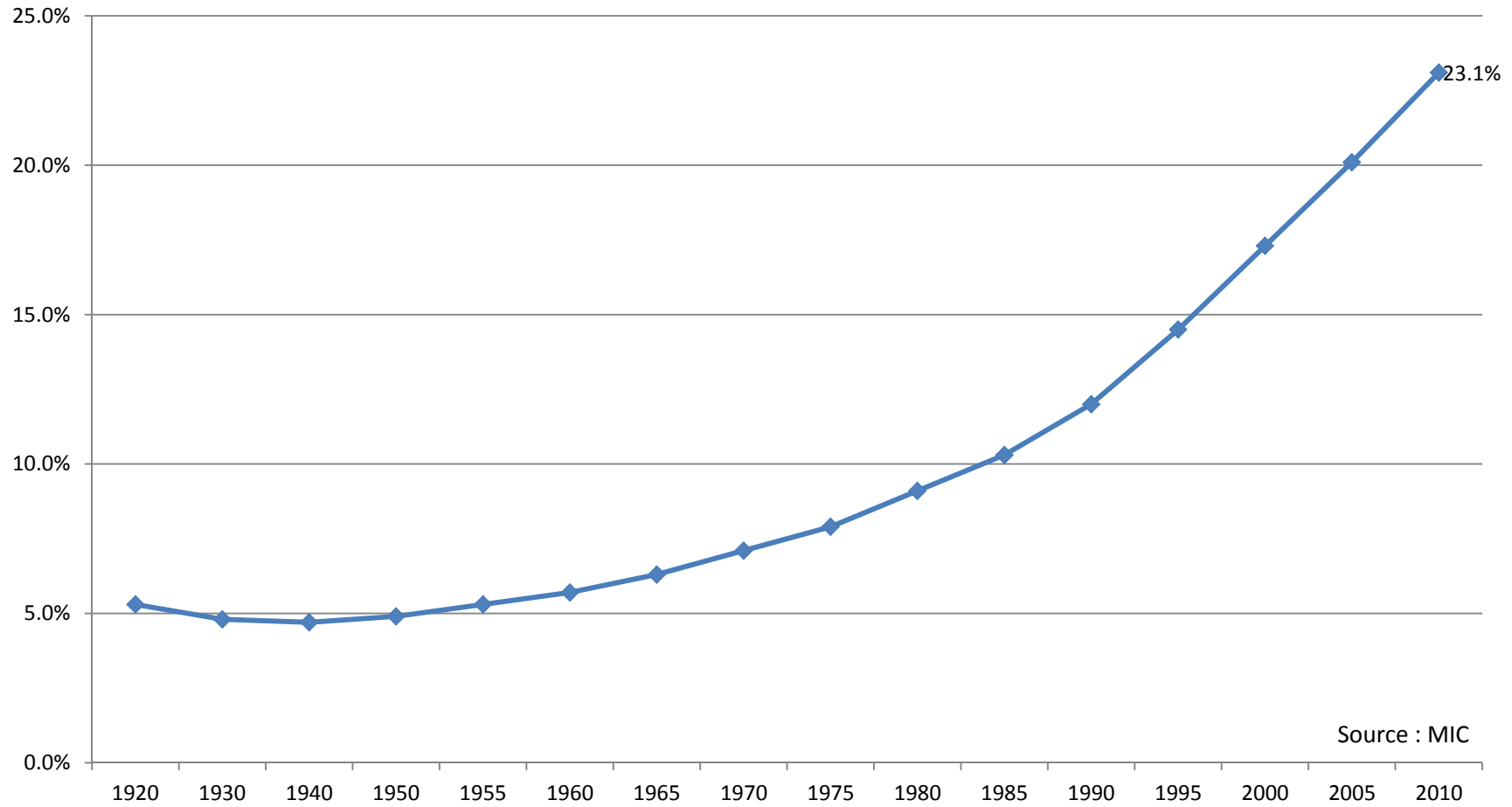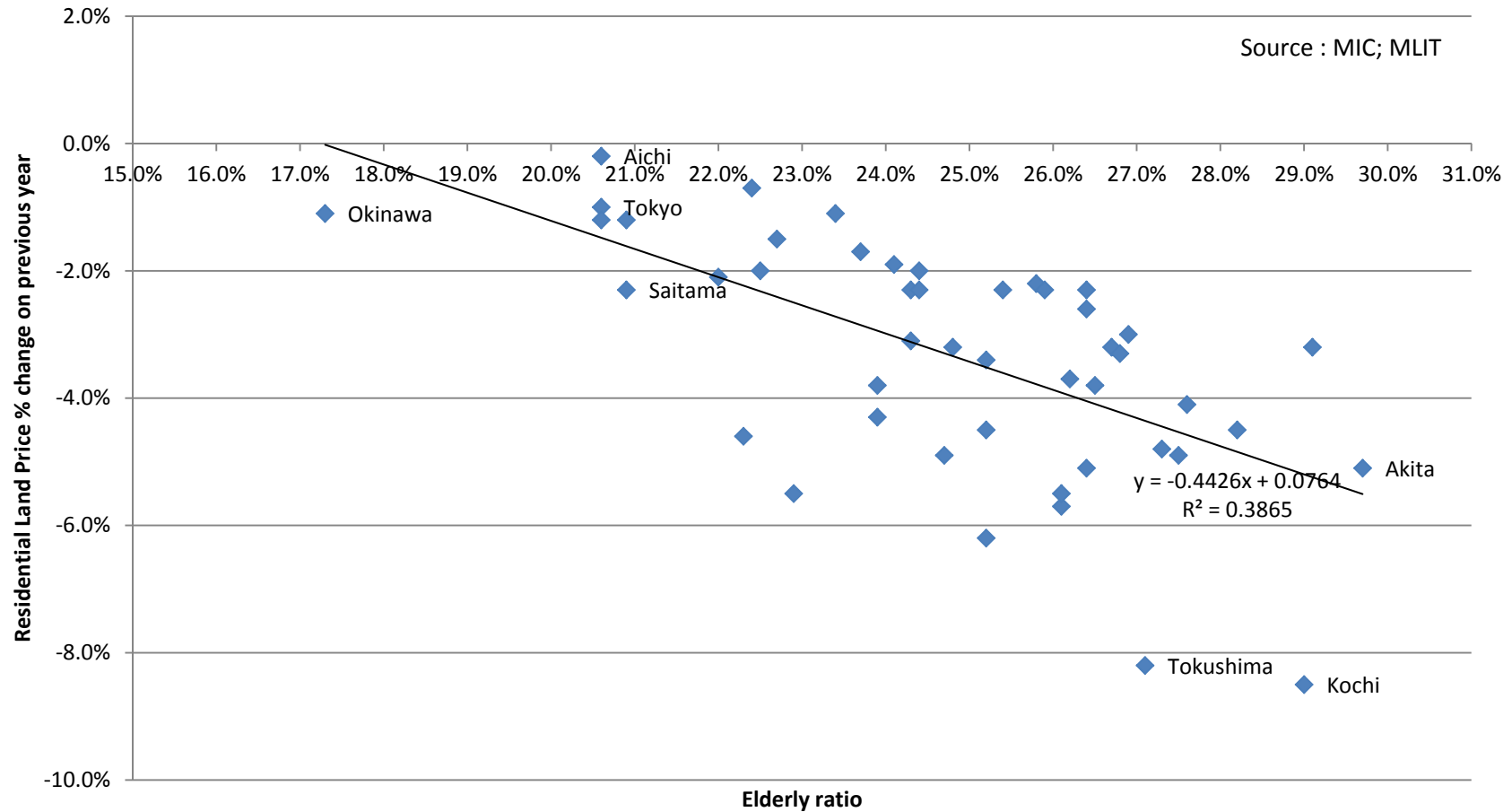
Figure 2   Indicator of Bubble

Source: WB

Figure 3 % Distribution of population aged 65 & over

Source : MIC

23.1%

6

Figure 4   Regression Analysis
Elderly ratio & Residential Land Price % change on previous year by prefecture

Table 1　Correlation coefficient between distribution of population aged 65 years and over, and rate of change in housing prices

Year	Correlation Coefficient
1995	+0.78
2000	+0.72
2005	−0.38
2010	−0.61

Source: Ministry of Internal Affairs and Communications (MIC); Ministry of Land, Infrastructure, Transport, and Tourism (MLIT)

Figure 5 Population Composition

Chart data:

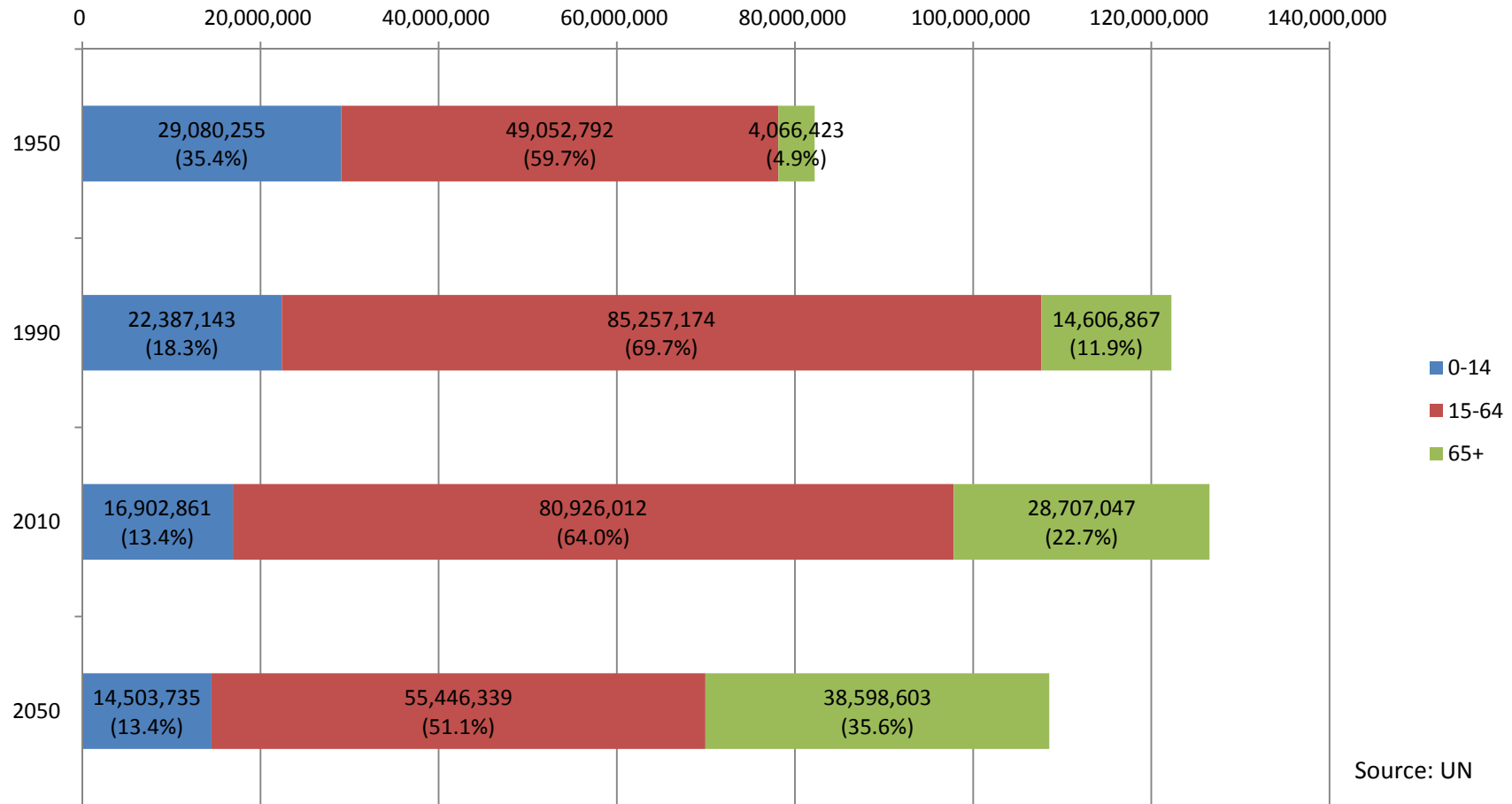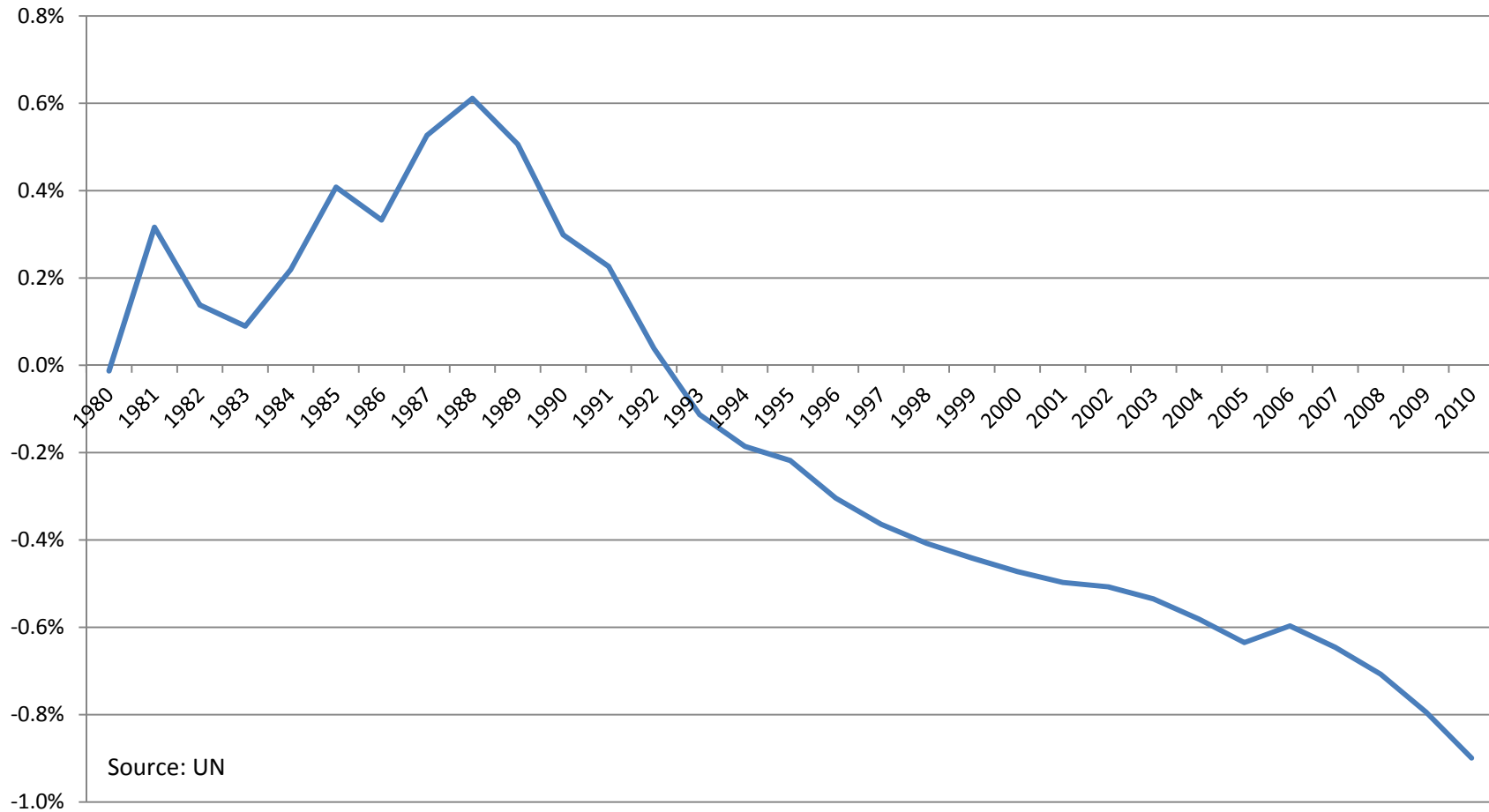| Year	0-14	15-64	65+
1950	29,080,255 (35.4%)	49,052,792 (59.7%)	4,066,423 (4.9%)
1990	22,387,143 (18.3%)	85,257,174 (69.7%)	14,606,867 (11.9%)
2010	16,902,861 (13.4%)	80,926,012 (64.0%)	28,707,047 (22.7%)
2050	14,503,735 (13.4%)	55,446,339 (51.1%)	38,598,603 (35.6%)

Source: UN

Figure 6   Indicator of Bubble Part.2
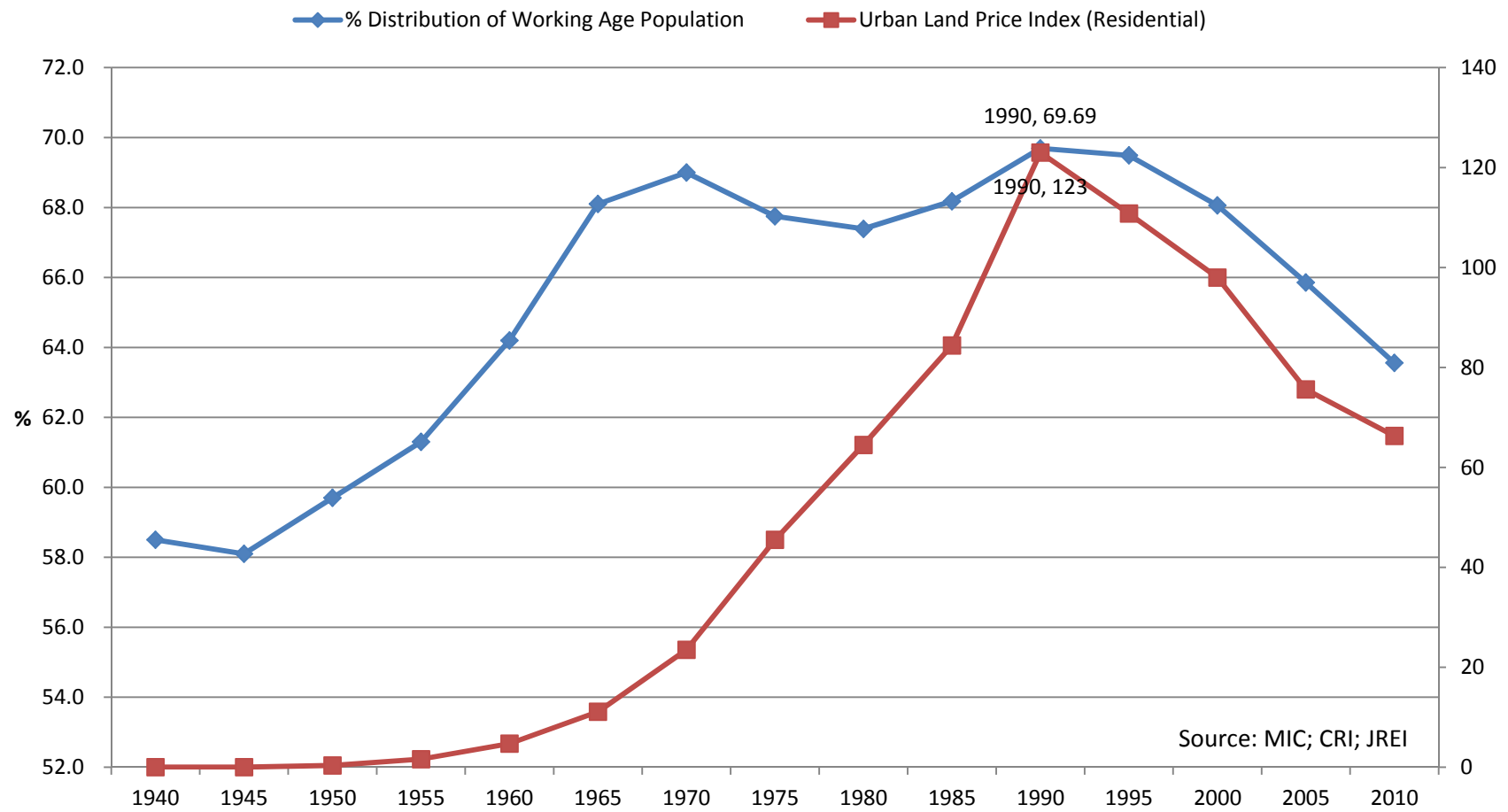(Working Age Population Growth – Total Population Growth)

Source: UN

The Correlation between Housing Bubble and WAP

Figure 7   Working Age Population & House Price (Japan)

Legend: ◆ % Distribution of Working Age Population   ■ Urban Land Price Index (Residential)

1990, 69.69

1990, 123

Source: MIC; CRI; JREI

Figure 8   Working Age Population & House Price (USA)
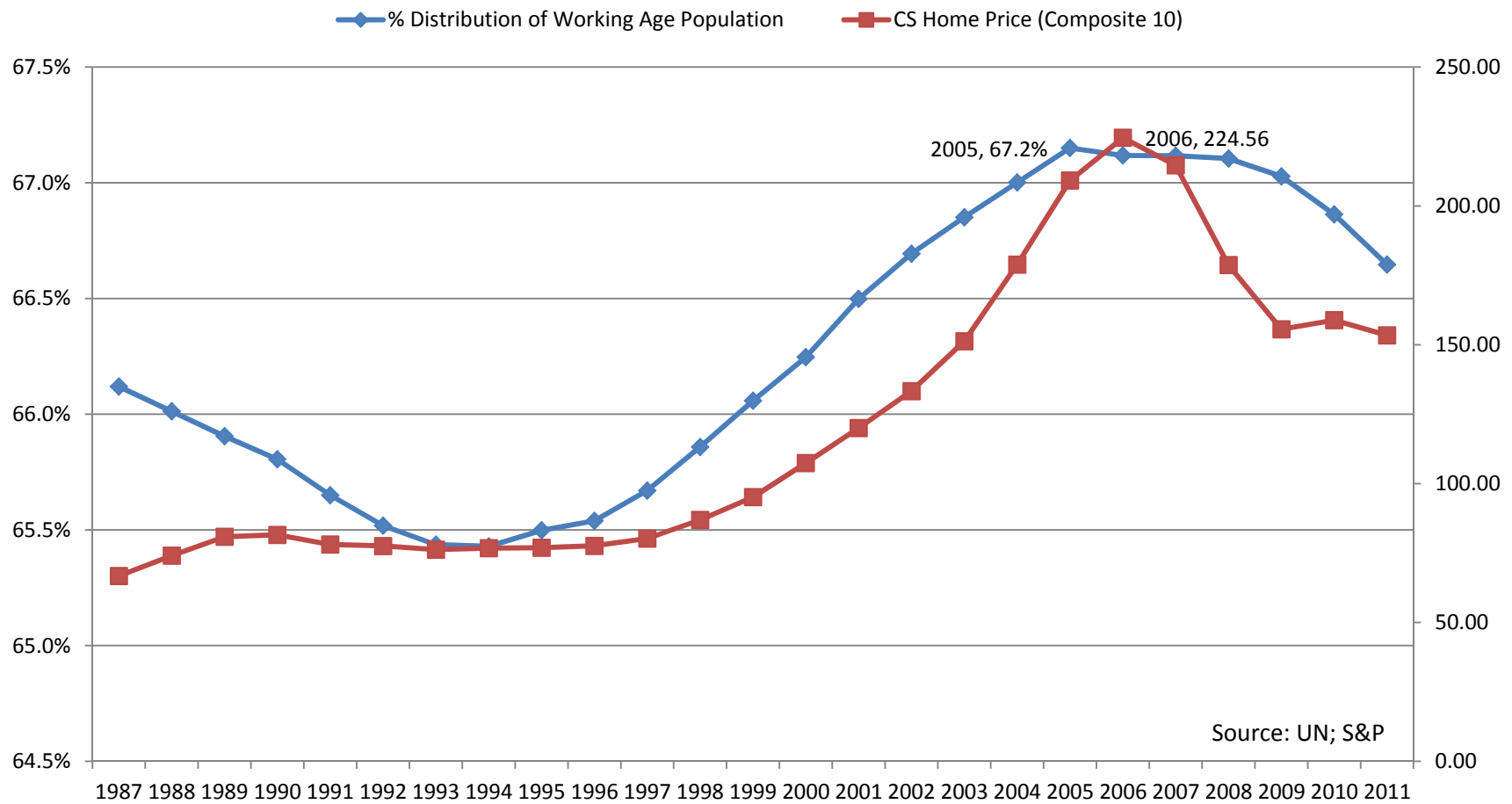
Figure 9 Working Age Population & House Price (Ireland)

Source: UN; Environment, Community and Local Government
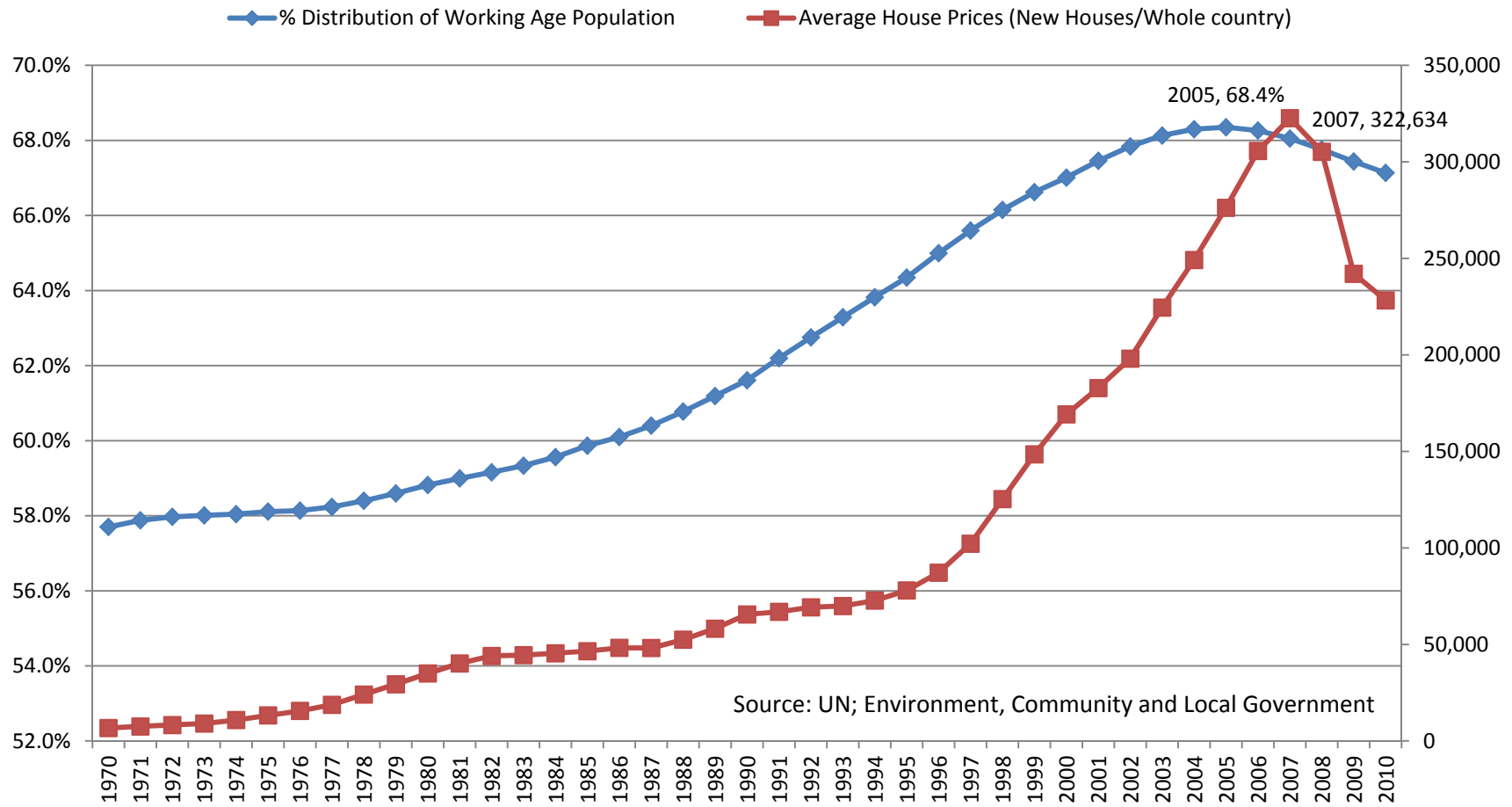
Figure 10   Working Age Population & House Price (Spain)
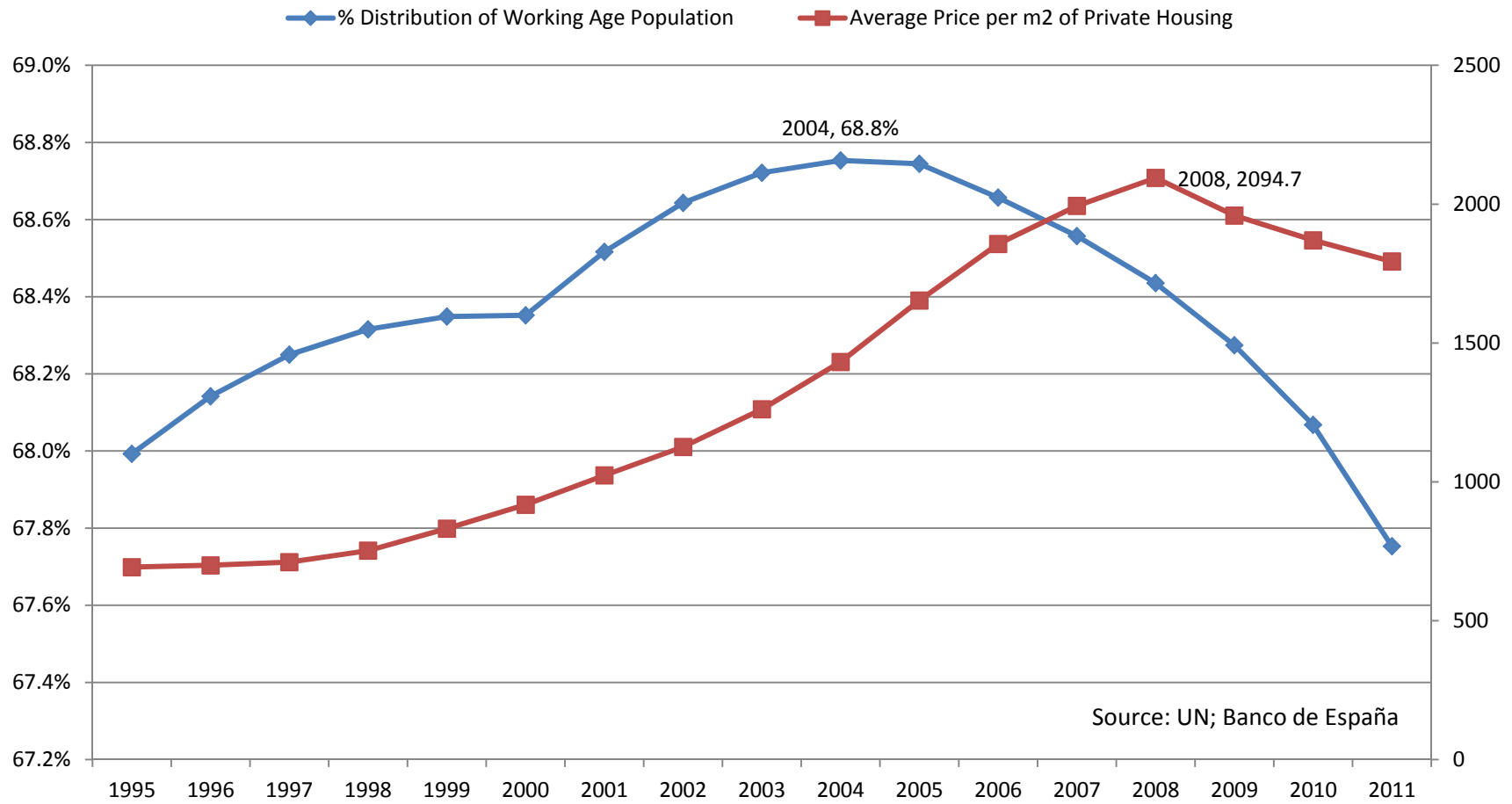
Figure 11   Working Age Population & House Price (UK)

1952, 66.3%

2008, 66.2%

2007, 9729.5

Source: UN; Nationwide

% Distribution of Working Age Population   House Price Index (All Houses)

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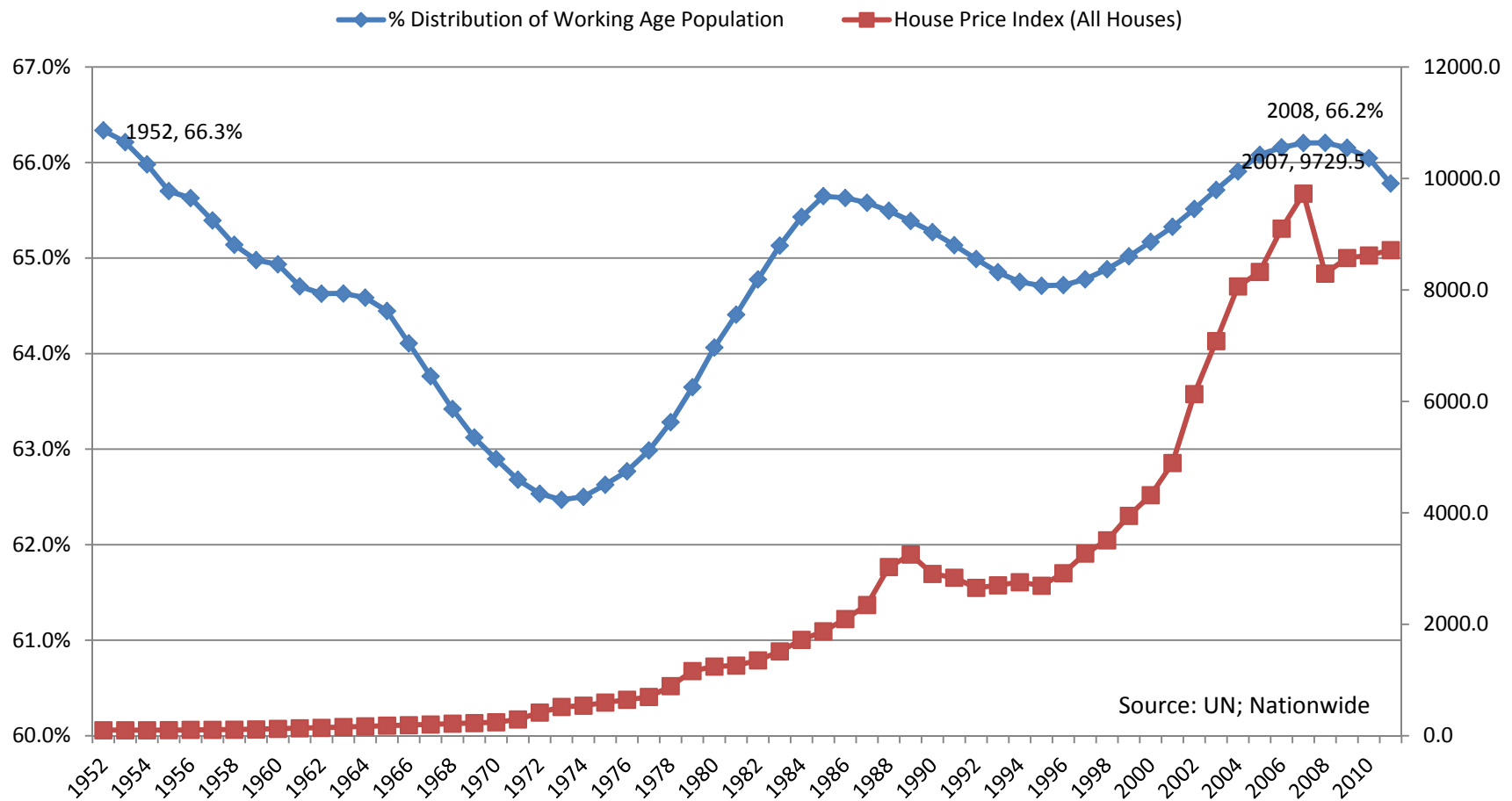
Interval Estimation of Housing Bubble

% of Working Age Population Peak

-2year   0   +6year

$$\overline{x} - t_{0.025}(n-1) \times \frac{s_x}{\sqrt{n}}$$

$$\overline{x} + t_{0.025}(n-1) \times \frac{s_x}{\sqrt{n}}$$
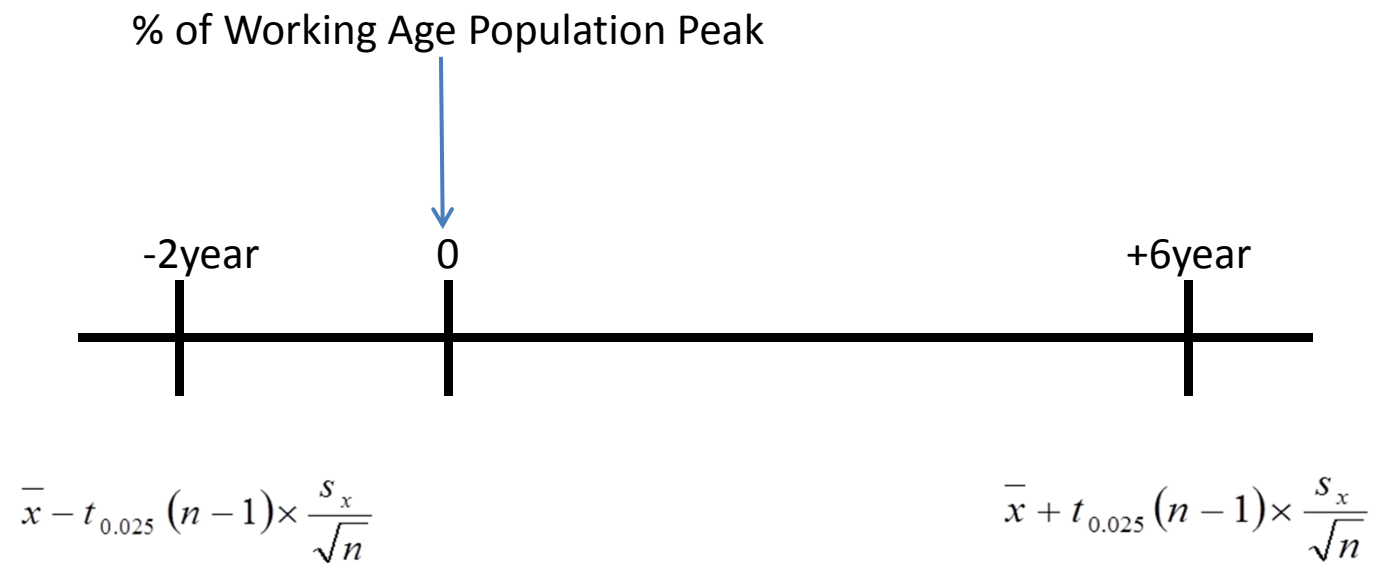
The Correlation between Housing Price and WAP

Table 2   Correlation between percentage change in housing prices and percentage change in WAP

$$\Delta hp = \alpha + \beta \Delta wap$$

Δhp : Percentage change in housing prices (Multiplication)

Δwap : Percentage change in WAP

	2000–2011
α	23.79**
	(2.26)
β	2.56**
	(2.64)
R^2	0.28

t-statistic in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%.

Source: UN [2010]; OECD [2012].

Table 3   Correlation between percentage change in housing prices and percentage change in WAP before and after the Lehman collapse

$$\Delta hp = \alpha + \beta \Delta wap$$

Δhp : Percentage change in housing prices (Multiplication)

Δwap : Percentage change in WAP

	Before (2000–2007)	After (2008–2011)
α	30.02***	−7.94*
	(3.16)	(−1.77)
β	4.44***	0.67
	(3.68)	(0.42)
R^2	0.43	0.01

t-statistic in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%.

Source: UN [2010]; OECD [2012].

Table 4   Multiple regression analysis between percentage change in housing prices and economic indicators

$$\Delta hp = \alpha + \beta_1 \Delta wap + \beta_2 \Delta gdp + \beta_3 \Delta ir$$

Δhp : Percentage change in housing prices (Multiplication)

Δwap : Percentage change in WAP

Δgdp : Percentage change in GDP growth (Multiplication)

Δir : Percentage change in interest rate (Remainder)

	Before (2000–2007)	After (2008–2011)
WAP	4.27**	−1.14
	(2.46)	(−0.86)
GDP	0.12	1.74**
	(0.13)	(2.57)
Interest Rate	3.54	−0.25
	(0.30)	(−0.21)
Adjusted R^2	0.33	0.40

t-statistic in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%.

Source: UN [2010]; OECD [2012].

Table 5　Correlation between percentage change in housing prices and percentage change in WAP for each country in each year

Country	2000–2011				
	α		β		R^2
Australia	8.50	(0.81)	−1.92	(−0.29)	0.01
Belgium	0.35	(0.17)	9.50*	(2.05)	0.30
Canada	1.88	(0.30)	3.15	(0.59)	0.03
Denmark	3.62	(0.69)	−5.26	(−0.22)	0.01
Finland	3.35*	(1.96)	−3.48	(−0.61)	0.04
France	−3.04	(−0.67)	16.56*	(2.04)	0.29
Germany	0.15	(0.07)	4.69	(0.58)	0.03
Greece	−4.40	(−1.46)	38.40**	(2.61)	0.40
Ireland	−18.91***	(−3.58)	12.83***	(4.15)	0.63
Italy	2.81	(1.28)	−1.27	(−0.19)	0.01
Japan	−4.82***	(−4.38)	−3.38*	(−1.91)	0.27
Korea	4.69	(0.86)	−5.11	(−0.54)	0.03
Netherlands	−4.02*	(−1.88)	19.94***	(3.28)	0.52
New Zealand	−19.31**	(−2.76)	17.93***	(3.51)	0.55
Norway	8.39	(1.64)	−2.80	(−0.59)	0.03
Spain	−17.83***	(−6.92)	18.32***	(9.01)	0.89
Sweden	4.01	(1.14)	2.55	(0.48)	0.02
Switzerland	3.31	(1.79)	−1.74	(−0.70)	0.05
United Kingdom	−11.04	(−1.31)	26.09*	(1.96)	0.28
United States	−13.91***	(−3.69)	14.49***	(4.12)	0.63

Table 6   Correlation between housing prices (indexes) and percentage of WAP after the Japanese bubble bust
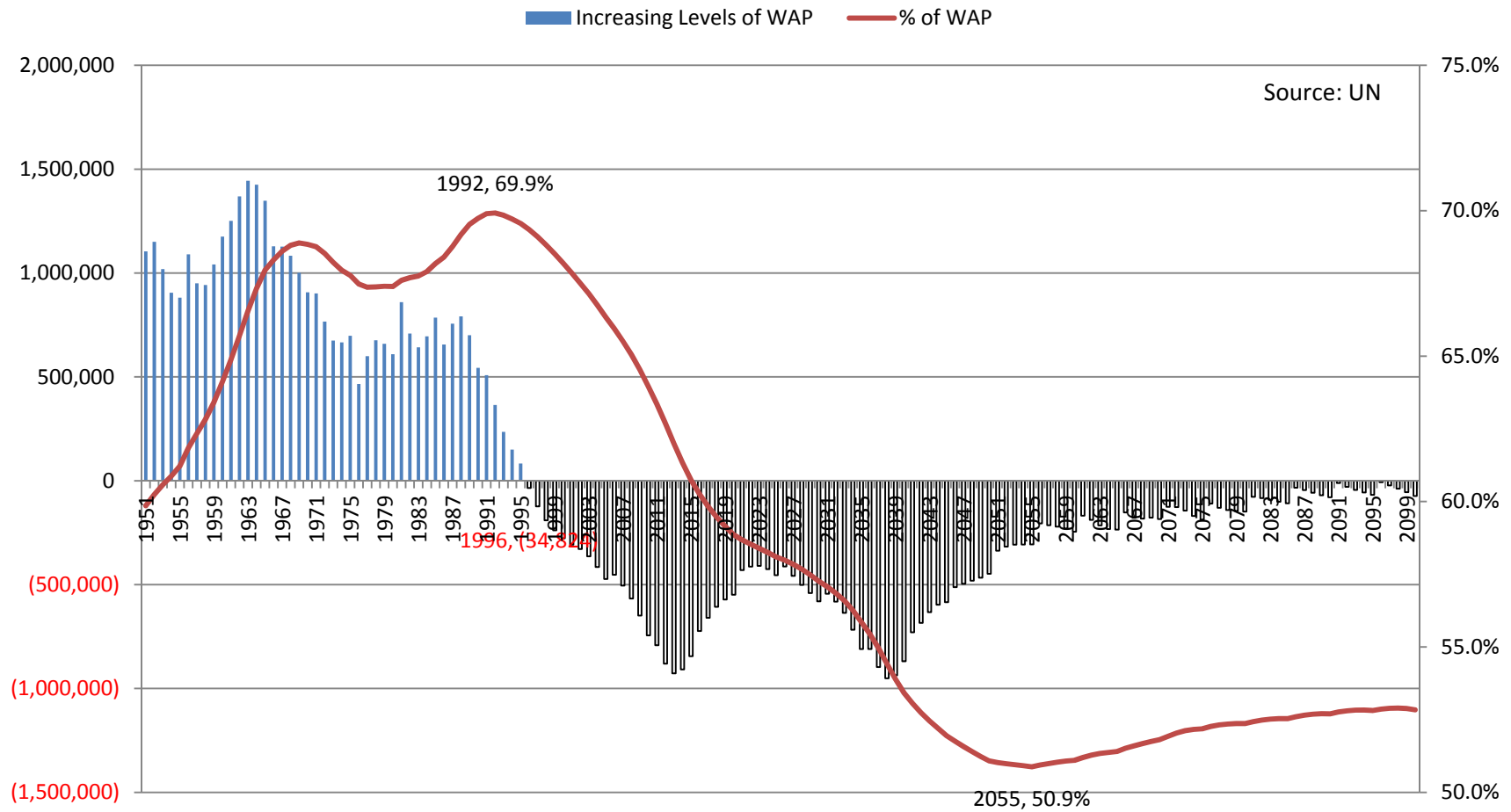
$$hp = \alpha + \beta pw$$

hp : Housing prices (indexes)

pw : % of WAP

	1990–2010
α	−498.18**
	(−5.74)
β	880.61***
	(6.83)
R^2	0.94

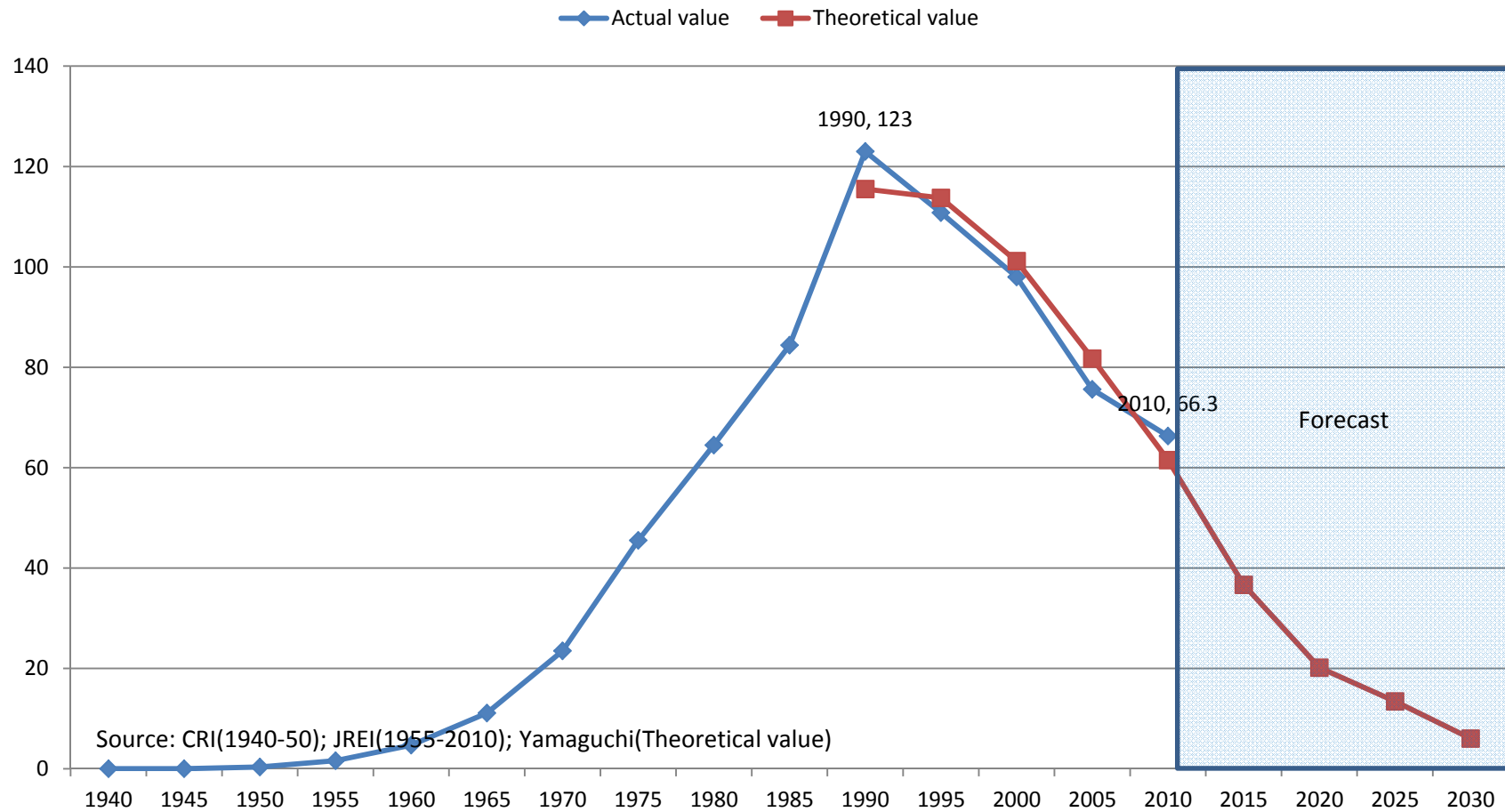t-statistic in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%.

Source: MIC [2010]; JREI [2012].

Working Age Population from 1951 to 2100 (Japan)

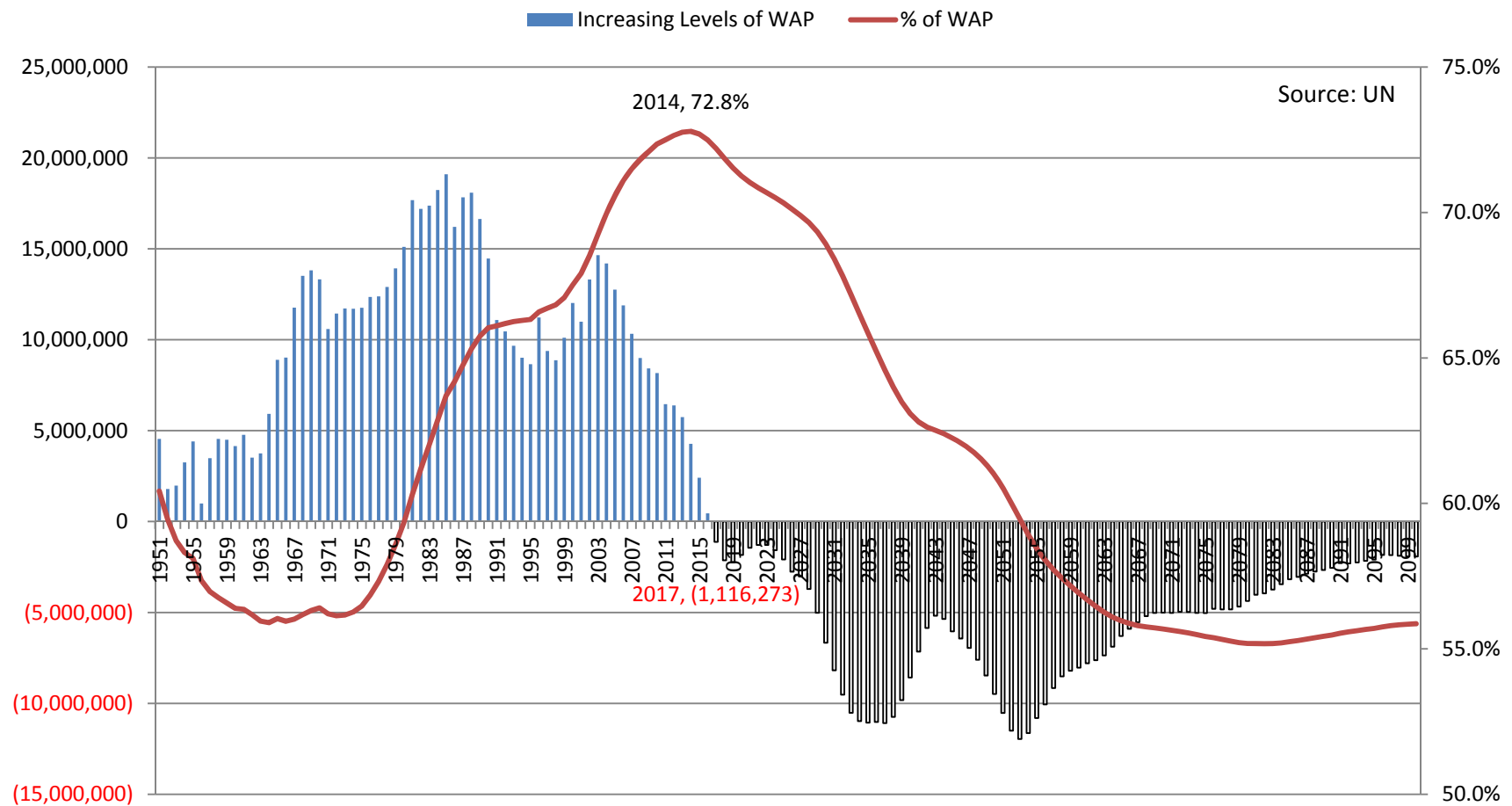Legend: Increasing Levels of WAP — % of WAP

Source: UN

1992, 69.9%

1996, (34,824)

2055, 50.9%

House Price Forecast

Source: CRI(1940-50); JREI(1955-2010); Yamaguchi(Theoretical value)

Discussion (Bonus)

Working Age Population from 1951 to 2100 (China)

Source: UN

2014, 72.8%

2017, (1,116,273)

Legend: Increasing Levels of WAP — % of WAP
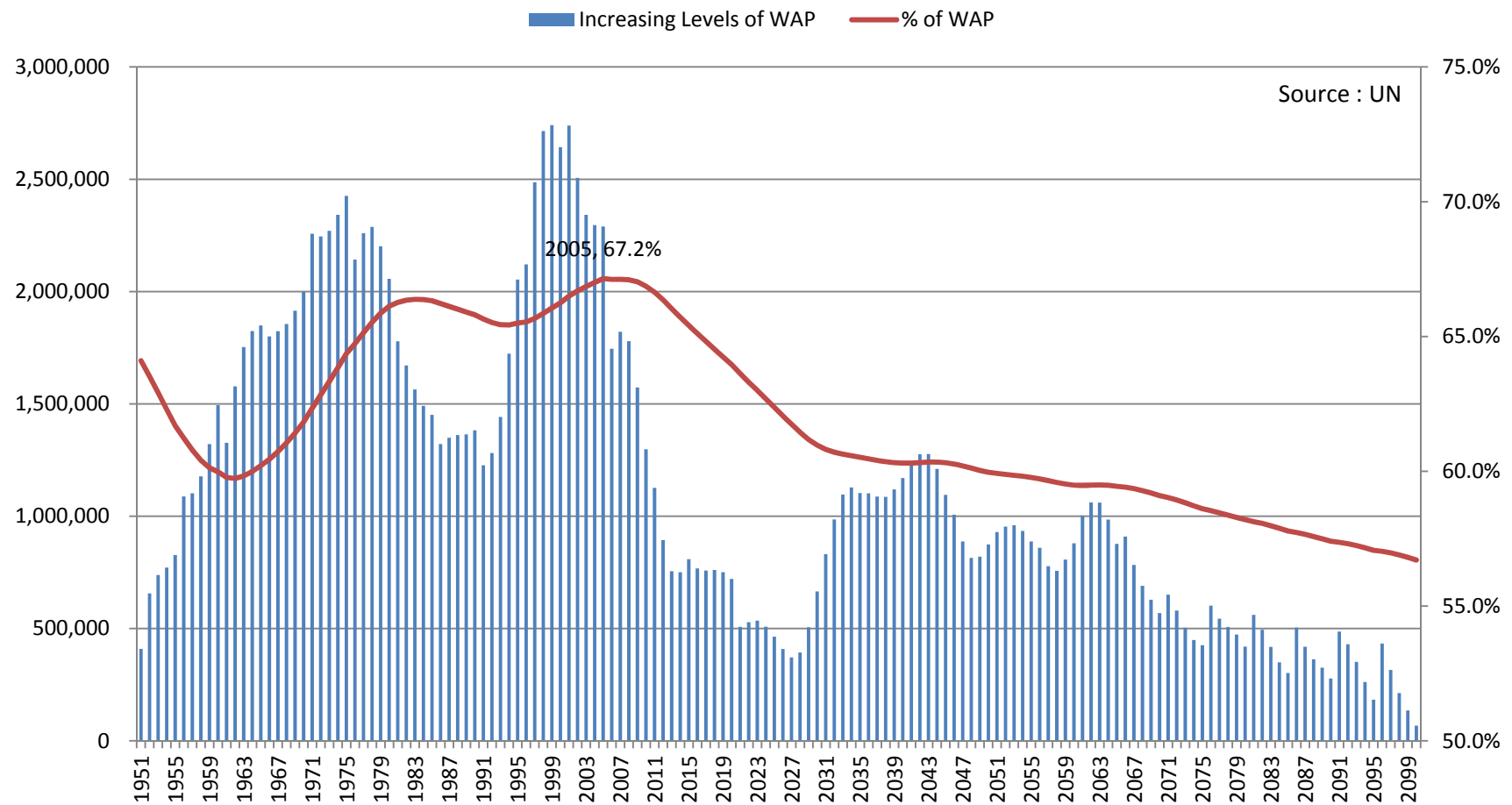
Indicator of Bubble Part.2 in China
(Working Age Population Growth – Total Population Growth)
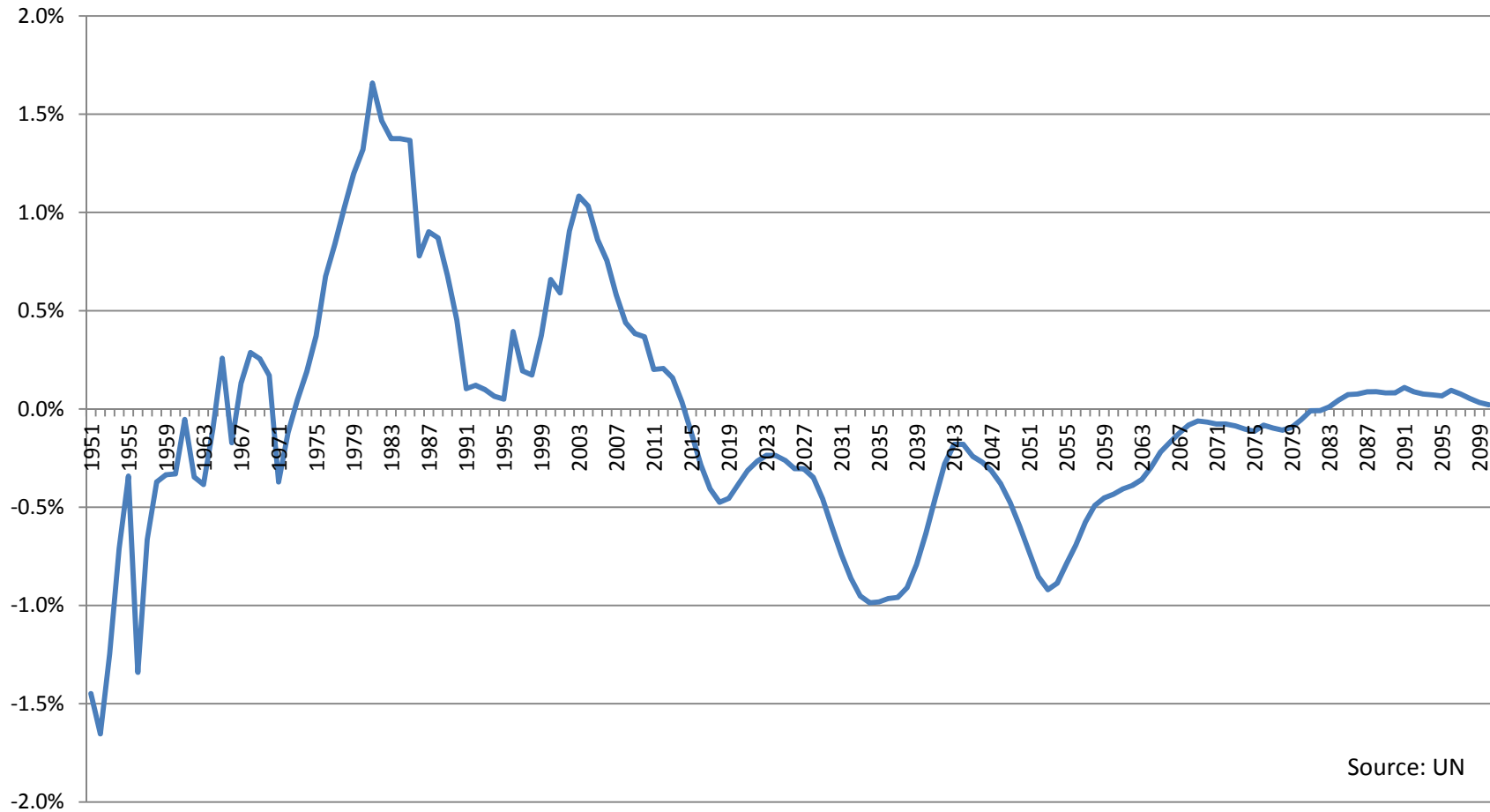
Source: UN

Working Age Population from 1951 to 2100 (USA)

Legend: Increasing Levels of WAP — % of WAP

Source : UN

2005, 67.2%

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Are Population Peaks related to Historical Events?

Country Area Organization	% of Working Age Population Peak	Working Age Population Peak	Population Peak	Historical Event
Eastern Europe	2010	2009	1992	The Fall of the Berlin Wall (1989)
Germany	1986	1997	2005	
Russian Federation	2010	2009	1993	The collapse of the Soviet Union (1991)
Greece	1999	2010	2044	Greek Debt Crisis (2009-)
Eurozone	1990	2010	2037	Eurozone Crisis (2010-)
Dem. People's Republic of Korea	2020	2022	2041	
TPP (Trans-Pacific Partnership, including Japan)	2009	2046	2098	

Source: UN

Figure 12   Movement of Total Population in Japan

Source: IPSS; UN
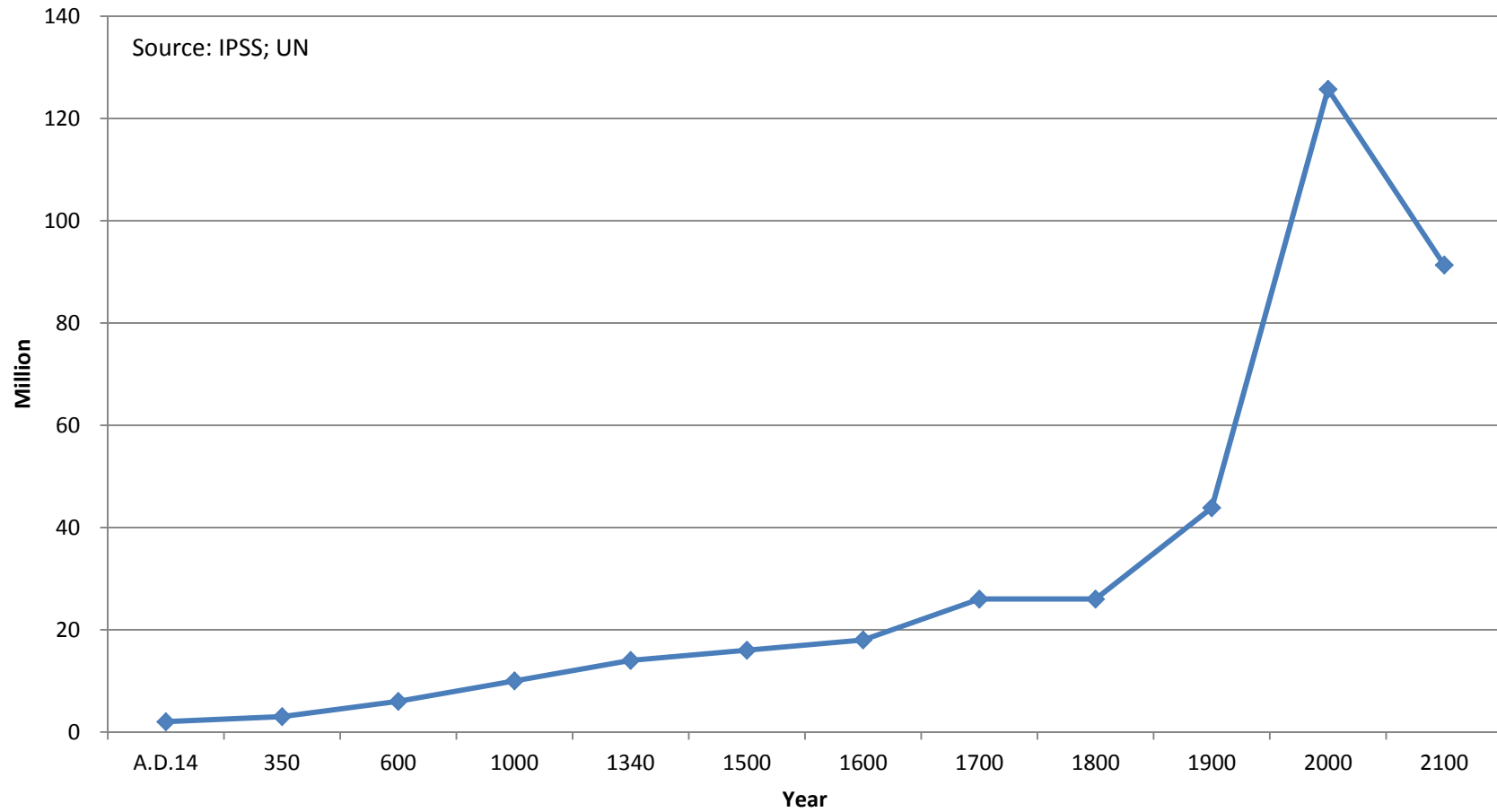
World Population Ranking (2010)

Rank	0-14	%	15-64	%	65+	%	Population	M
1	Niger	49.0	Qatar	85.5	Japan	22.7	China	1,341
2	Uganda	48.4	United Arab Emirates	82.5	Germany	20.4	India	1,225
3	Mali	47.2	China, Macao SAR	79.9	Italy	20.4	United States of America	310
4	Angola	46.6	Bahrain	77.9	Greece	18.6	Indonesia	240
5	Afghanistan	46.4	China, Hong Kong SAR	75.8	Sweden	18.2	Brazil	195

Source: UN

World Population Ranking (2050)

Rank	0-14	%	15-64	%	65+	%	Population	M
1	Zambia	43.7	Lao People's Democratic Republic	70.3	Japan	35.6	India	1,692
2	Malawi	40.2	Ethiopia	70.0	Portugal	34.0	China	1,296
3	Niger	40.1	Swaziland	69.9	Republic of Korea	32.8	United States of America	403
4	Somalia	40.0	Cambodia	69.7	Italy	32.7	Nigeria	390
5	United Republic of Tanzania	38.0	Botswana	69.5	Spain	32.6	Indonesia	293

Source: UN

Conclusion

1 The year that the percentage of the WAP peaks coincides with the bursting of housing bubbles.

2 The rate of change in housing prices is significantly correlated with the rate of change in the WAP in some countries.

3 We can predict housing prices to some extent, using the prediction of the WAP, unless financial innovations intervene.

Thank you very much.

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