DEMOGRAPHIA

14th Annual Demographia International Housing Affordability Survey: 2018

Rating Middle-Income Housing Affordability

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Introduction by
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Data for 3rd Quarter 2017

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INTRODUCTION

Measuring Affordability: Alternative Perspectives

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Britain's Office of National Statistics reported that houses were the most valuable asset in the UK at £5.5 trillion, accounting for 62% of the UK's total net worth at the end of 2015: up from 48.7% 20 years previously. This compared to net asset values of Equity and Investment funds of a 'mere' £115billion.According to the Halifax the value of the UK housing stock had risen another £500billion to £6tn by November 2017, up from just over £4tn in 2007. No wonder the British – a country largely of homeowners – are obsessed with the asset value of housing while at the same time complaining about the real crisis of housing affordability.

This is of course the first paradox of housing 'affordability': housing is both an asset and a good providing a flow of housing services – a place to live. The interests of house owners do not align with those of would be house owners. Rising house prices relative to incomes pit the old against the young and the rich against the poor.

Before we can have useful debates or even give a balanced assessment of the issues we need good measures. Here Demographia has done wonders over the past decade to focus public debate on the inequity of rising house prices relative to incomes. As Oliver Hartwich in his Introduction to the 13th edition last year said "Demographia's' median multiple' approach…firmly established a benchmark for housing affordability by linking median house prices to median household incomes. It… is not a perfect measure because it does not account for house sizes or build quality. But it is the only index that allows a quick comparison of different housing markets, and it is the best approximation of housing affordability measures we have to date."

We agree. Apart from the median multiple being simple and useful, it is also the only measure out there for purposes of international comparison. The point of this introduction is to explore how it fares when we pull it about: using more precise definitions of what spatial housing markets might really be, accounting for differences in housing unit size and looking at the impact of housing affordability for households at different places in the overall distribution of incomes. We do this using data for Britain: the cradle of housing unaffordability and the originator of the ideas and mechanisms of planning which have contributed so much to the problem: Green Belts and planning by unpredictable political processes!

What we do and what we find

i) Replication

Demographia did not originate the 'median multiple' (MM) as a measure of housing affordability but they have done great work popularising it. As academics, however, we believe in 'replicability'. So, our first task was just to see if, using no more than the information about sources and methods in last year's issue, we could replicate the 3rd Quarter 2016 MMs for the UK housing markets shown in the 13th Survey[1]. Our exact sample of transacted houses was not identical and our estimates of median household incomes are a bit different but the broad conclusion is that the replication was successful. The correlation between our estimated MMs and those reported by Demographia is 0.92. Both sets of MMs are shown in columns 3 and 4 of Table 1 and illustrated in the following figure.

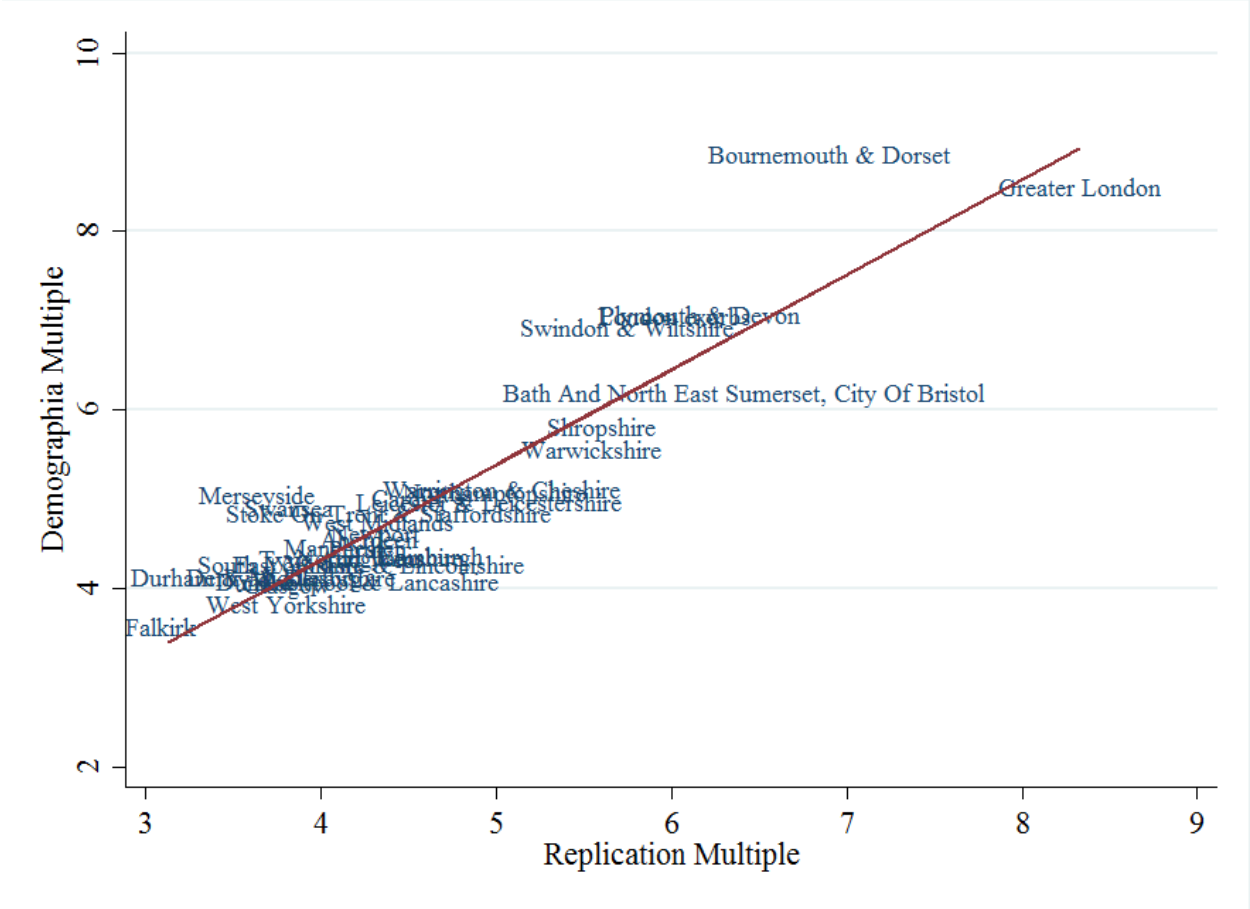
ii) Housing markets

The next issue is 'what is a housing market'. Elementary urban economics tells us that housing markets are spatially bounded and their extent is determined by the need to travel to jobs.Almost all house purchases are paid forout of incomes and to earn those incomes people must travel to work.So, housing markets are essentially coincident with broadly defined urban areas – Functional Urban Regions. Until very recently, although there were official definitions and data for such areas in the US, they were not defined in many other countries. Now – since 2014 – the OECD has defined such regions on a comparable international basis but provides only a limited set of data for them – not including house prices or even household incomes.

As a result, while Demographia is able to use core-based urban regions for the US and a few other countries, it does not in Europe. Here they have had to use data for Eurostat's official administrative regions. In Britain these are a mixture of Counties, Unitary Authorities and even Government Regions, such as Greater London. These, in economic terms, are a disparate group, seldom corresponding to actual housing markets, so our next step was to estimate MMs for areas more closely matching housing market areas. In Britain, there is a set of widely used Travel to Work Areas

[1]**Sources:** In addition to the data referenced in Demographia's 13th Edition we used: *Annual Survey of Hours and Earnings (ASHE)* and *the Effects of Taxes and Benefits on Household Income* dataset from *Office for National Statistics* to calculate median household income and income distributions.; *National Statistics Postcode Lookup Centroids* from *Office for National Statistics* to identify TTWAs; *Domestic Energy Performance Certificate Register* published by *Department for Communities and Local Government* to calculate house size and price per m^2 in England and Wales; P*olicy paper tax and tax credit rates and thresholds for 2016-17* from *HM Treasury* to calculate after tax and national insurance household income.

TTWA) that we take as functional urban areas here.[2] We focus only on TTWAs that were located within the administrative regions used by Demographia and that had a significant town in them. We can see from Table 1 that while some Demographia 'Housing Markets' such as Aberdeen, Cardiff or Liverpool & Merseyside corresponded to just one TTWA, others such as Birmingham & West Midlands, covered several TTWAs and at the extreme, in 'London Ex-urbs', there are 12 TTWAs with MMs in our replications varying from 4.6 (Peterborough) to 7.8 (Brighton). These compare to our replication MMs for the corresponding Demographia market of 6.0. One should remember, however, that our TTWAs in the London Ex-urbs do not cover its whole area.



Note: The figure illustrates our replication of the Demographia median multiples. The vertical axis represents the Demographia multiple as included in the 2016 report. The horizontal axis represents ourreplication multiple. The line corresponds to fitted values of a linear regression. The correlation between variables is 0.92.

[2]These are not strictly urban regions since the criterion used to define their boundaries is 'self-containment': 75%, of the employed population resident in them also work in them. Unlike urban regions therefore their extent necessarily covers the whole country and some may be quite rural: the Orkney Islands, for example, constitute a TTWA.

TABLE 1: ALL HOUSING MARKETS IN THE UK BY GEOGRAPHY
Multiple (Median House Price/Median Household Income): 2016 – 3rd Quarter

House Market		*Multiple*				
1	2	3	4	5	6	7
Demographia	**TTWA**	**Demographia**	**Replication**	**TTWA**	**Replication2**	**TTWA2**
Aberdeen	Aberdeen	4.551	4.318	4.744		
Birmingham & West Midlands	Birmingham	4.753	4.323	4.667	4.526	4.844
	Wolverhampton and Walsall			4.275		4.420
	Dudley			4.233		4.415
	Coventry			4.354		4.403
Blackpool & Lancashire	Blackpool	4.084	4.357	4.332	4.129	4.054
	Preston			4.304		4.110
	Lancaster and Morecambe			4.443		4.329
	Burnley			2.750		2.676
	Blackburn			3.633		3.371
Bournemouth & Dorset	Dorchester and Weymouth	8.863	6.938	6.453	6.764	5.893
	Poole			7.430		7.360
	Bournemouth			7.136		7.240
Bristol-Bath	Bristol	6.189	6.413	6.175	6.661	6.368
	Bath			7.719		7.129
Cardiff	Cardiff	5.017	4.531	4.037	4.680	4.094
Derby & Derbyshire	Derby	4.132	3.868	3.968	3.963	4.035
	Chesterfield			4.092		4.213
Dundee	Dundee	4.076	3.666	3.744		
Edinburgh	Edinburgh	4.370	4.671	4.750		
Falkirk	Falkirk and Stirling	3.576	3.133	3.248		
Glasgow	Glasgow	4.043	3.845	3.502		
Hull & Humber	Hull	4.277	4.328	4.086	4.103	4.010
	Grimsby			4.057		3.908
Leeds & West Yorkshire	Wakefield and Castleford	3.826	3.837	3.934	4.005	3.912
	Leeds			4.295		4.574
	Bradford			3.720		3.860
Leicester & Leicestershire	Leicester	4.972	5.004	4.884	5.131	5.056
Liverpool & Merseyside	Liverpool	5.055	3.677	3.763	3.638	3.655
London (Greater London Authority)	London	8.494	8.328	8.163	9.185	8.773

London Exurbs (E & SE England)	Peterborough	7.054	6.014	4.624	6.084	4.386
	Luton			6.560		7.259
	Southend			5.969		6.108
	Medway			5.111		5.284
	Milton Keynes			5.365		5.398
	Brighton			7.788		8.621
	Portsmouth			4.971		4.978
	Southampton			5.929		5.972
	Isle of Wight			5.085		5.232
	Bedford			5.462		5.346
	Oxford			6.365		6.269
	Cambridge			6.759		6.423
Manchester & Greater Manchester	Manchester	4.462	4.132	4.306	4.357	4.560
Middlesbrough & Durham	Durham and Bishop Auckland	4.130	3.599	3.410	3.244	3.026
	Middlesbrough and Stockton			4.260		4.020
Newcastle & Tyneside	Newcastle	4.332	4.112	4.150	4.180	4.165
Newport	Newport	4.620	4.346	4.213	3.846	3.865
Northampton & Northamptonshire	Northampton	5.080	5.036	5.171	4.831	5.004
	Kettering and Wellingborough			4.559		4.410
	Corby			4.785		4.636
Nottingham & Nottinghamshire	Nottingham	4.346	4.336	4.114	4.294	4.159
	Mansfield			3.998		3.829
Perth	Perth	4.452	4.232	4.408		
Plymouth & Devon	Plymouth	7.072	6.207	5.233	5.867	5.087
	Exeter			6.336		6.020
Sheffield & South Yorkshire	Sheffield	4.267	3.819	4.080	4.016	4.387
	Doncaster			3.675		3.567
	Barnsley			3.408		3.417
Stoke on Trent & Staffordshire	Stoke on Trent	4.843	4.431	3.728	4.454	3.877
	Stafford			4.659		4.350
Swansea	Swansea	4.903	3.854	3.482	3.678	3.254
Swindon & Wiltshire	Swindon	6.928	5.787	5.405	5.556	5.258
Telford & Shropshire	Telford	5.810	5.636	4.879	5.176	4.412
Warrington & Cheshire	Warrington and Wigan	5.110	5.072	3.718	4.866	3.721
	Chester			4.755		4.609
Warwickshire	Leamington Spa	5.551	5.586	6.901	5.287	6.301
Median Market		4.686	4.341	4.426	4.490	4.413

Note: Table reporting our replication of the Demographia MM (column 4), the calculation of MM for TTWAs (column 5), the MM after size adjustments as described in the text (column 6) and a column combining both TTWA and unit size adjustments (column 7).

The basic conclusion of this exercise is that, as expected, administratively defined regions are very varying in their relationship to 'real' housing market areas and so can conceal a big range of affordability within them: about one quarter of the variance in TTWA MMs is not explained by regional level measures.

iii) Does adjusting for the size of houses make a difference?

Our initial thoughts were that once one controlled for their size, houses in the more expensive markets would be considerably less affordable than they appeared to be on the simple MM measure. The reasoning was that because they were more expensive relative to incomes, they would also be smaller, and simply measuring the median house price would not reflect that. Further thinking suggested, however, a countervailing force: while space might be more expensive, incomes are also generally higher in more expensive, larger cities, and research shows that people spend more on it as they get richer: they want bigger bedrooms for example and perhaps a spare one, possibly an additional bathroom.This might tend to make houses bigger where people are richer even though the unit cost of space may be higher. In fact, research estimating income elasticities of demand for housing space suggests that peoples' spending on space in houses rises faster than incomes – if income increases by 10% spending on housing space increases by about 20%. Indeed, as one of us has frequently argued, this is one of the main drivers of increasing real house prices over time as incomes rise in the face of constraints on the space for houses imposed by restrictions on urban growth. These two forces might work against each other, therefore, meaning that adjusting for differences in house sizes might make only a small difference to affordability.

The data on the price of space in houses is only available for England and Wales[3] so in the columns of Table 1 showing the results, 6 and 7, we have had to exclude the Scottish markets. What we find is that whether we compare the Demographia Markets or the TTWAs we prefer, controlling for size makes not a lot of difference to measured affordability using the simple MM.

The median house in Britain is very small – 83.9 m^2: new houses are even smaller at 76m^2. This compares to 137m^2 in Denmark or 214m^2 in the US, according to RIBA,so clearly you get a lot less house for your money in Britain than in Denmark or the US, but the difference in this across British markets is not so big. We would argue the most revealing comparison is between our 'replication' MM for the TTWA with the size adjusted TTWA MM. To estimate this we assume that all markets have the same median house size of 83.9m^2. On this measure in the least affordable market – the London TTWA – affordability deteriorates from an MM of 8.2 to 8.8. In a low income and more affordable market such as Hull, TTWA affordability is almost the same on both measures while in one of the most affordable TTWAs in all of Britain – Burnley in Lancashire – affordability actually improves once the size of houses is taken into account.

[3] Data on the area of houses is collected for purposes of estimating energy efficiency: for this reason, the measure of area used includes the area of garages associated with houses only if the garage is heated from the main central heating system of the house. The area is excluded if the garage is thermally separated from the house. The assessors told us that the great majority of garages (up to 95%) are not heated: so ignoring them makes little difference to the affordability measures we calculate.

So overall there seems to be evidence that adjusting for house sizes has some effect on estimated affordability across British markets, but it is not very large. The two measures are very closely related – the correlation is 0.98 – and while the regression coefficient is consistent with falling size-adjusted affordability as market affordability worsens, the effect is not statistically significant. The evidence within Britain indicates that adjusting for size has a smaller effect than might be first thought, and smaller than it seems to be internationally where house sizes vary very strongly. They tend to be bigger where they are more affordable. Even that is not a uniform effect, however: by international standards houses are big in both Australia and New Zealand but relatively unaffordable.

iv) Affordability for the poor compared to the rich

Finally, we turn to exploring differences in affordability for different income groups. Instead of using the median multiple method employed in Demographia, we now focus on the 10th, 25th, 75th and 90th percentiles of the income and house price distributions and re-calculate our multiples for these. In this way, we provide measures of affordability for selected groups at very different points in the income distribution, highlighting the distributional aspects of affordability problems.

Our results for different percentiles are provided in Table 2. We observe a systematic difference across the income distribution with higher multiples – lower affordability – for relatively poor households. The average multiple for households in the lowest 25th percentile for example is about 5.5, but this improves to 4.5 for households in the top 25th percentile of the income distribution. Moreover, careful inspection of the table reveals that these differences are especially large in cities that are less affordable, such as London (10.3 vs. 7.8 for the bottom and top 25th percentiles respectively), and when we compare the extremes of the income distribution (e.g. highest decile versus lowest decile; for London it is 15.5 vs. 8.0). While these alternative estimates all exhibit high correlations with the Demographia multiples, they reveal a dimension of affordability and inequality that is masked by focusing only on medians.

v.) Affordability before or after tax?

Lastly, we note that Demographia's MMs, like ours are based on gross rather than net (after-tax) incomes. In a final exercise (not shown in tables) we recalculated our multiple measures taking into account different income tax bands and rates and national insurance (NI) contributions. The findings are interesting. While we do not find much of a difference for the median multiples, the affordability gap narrows very markedly for top and bottom deciles, when tax and NI differences are accounted for. For example, while London's bottom and top decile income groups have stark differences in pre-tax multiples of 15.5 vs 8.0, this narrows to 15.5 vs. 11.5 when taxes and NI-contributions are taken into account. For some of the least unaffordable cities the gap closes completely, or even reverses. For example, Liverpool and Merseyside have pre-tax top and bottom decile multiples of 5.0 and 3.9 respectively, the after-tax multiples are 5.0 vs. 5.1.

TABLE 2: ALL HOUSING MARKETS IN THE UK BY GEOGRAPHY
Multiple (Median House Price/Median Household Income): 2016 – 3rd Quarter

Housing Market	*House Price / Gross Income*					*Demographia*
	Top 10%	*Top 25%*	*Median*	*Bottom 25%*	*Bottom 10%*	
Aberdeen		4.192	4.318	5.201		4.551
Birmingham & West Midlands	4.439	4.084	4.323	5.214	7.250	4.753
Blackpool & Lancashire	3.772	4.185	4.357	4.354	5.012	4.084
Bournemouth & Dorset		6.243	6.938	8.536	11.578	8.863
Bristol-Bath		6.593	6.413	7.997	12.132	6.189
Cardiff		4.007	4.531	5.761		5.017
Derby & Derbyshire	4.111	3.769	3.868	4.796	6.554	4.132
Dundee		3.923	3.666	3.579		4.076
Edinburgh		4.780	4.671	5.135	7.688	4.370
Falkirk		3.310	3.133	3.202	4.039	3.576
Glasgow		3.858	3.845	3.953	4.770	4.043
Hull & Humber		3.937	4.328	5.197	7.013	4.277
Leeds & West Yorkshire	4.079	3.870	3.837	4.252	5.745	3.826
Leicester & Leicestershire	4.237	4.727	5.004	6.199	7.564	4.972
Liverpool & Merseyside	3.851	3.435	3.677	3.806	5.044	5.055
London (Greater London Authority)	8.050	7.832	8.328	10.302	15.486	8.494
London Exurbs (E & SE England)	5.600	5.572	6.014	7.262	10.265	7.054
Manchester & Greater Manchester	4.375	4.079	4.132	4.739	6.422	4.462
Middlesbrough & Durham	3.994	3.691	3.599	3.470	3.914	4.130
Newcastle & Tyneside		3.902	4.112	4.799	5.613	4.332
Newport		4.085	4.346	4.926		4.620
Northampton & Northamptonshire	4.450	4.704	5.036	5.894	8.561	5.080
Nottingham & Nottinghamshire	3.831	4.323	4.336	4.787	6.893	4.346
Perth		4.079	4.232	4.564	5.604	4.452
Plymouth & Devon	5.713	5.938	6.207	7.387	11.650	7.072
Sheffield & South Yorkshire	4.140	3.633	3.819	4.427	5.753	4.267
Stoke on Trent & Staffordshire	4.102	4.386	4.431	4.890	5.690	4.843
Swansea		3.466	3.854	4.357	6.024	4.903
Swindon & Wiltshire		5.439	5.787	7.145	11.293	6.928
Telford & Shropshire		5.139	5.636	7.212	9.833	5.810
Warrington & Cheshire		4.844	5.072	5.895	7.319	5.110
Warwickshire	5.201	5.158	5.586	6.264	8.842	5.551
Median Market	4.188	4.135	4.341	5.030	6.953	4.686

Note: Table reporting median multiples using our data sources for different quantiles of the unit price and income distributions as specified in the column headings. Demographia median multiples included in column

Conclusions

To sum up, our analysis for Britain revealed some interesting insights. Overall, we were able to replicate Demographia's MMs for their definitions of regions pretty well. These figures however conceal a big range of affordability across housing markets within these regions. Perhaps surprisingly, taking account of the fact that the size of houses could vary substantially across housing markets, this makes little difference to our housing affordability measures suggesting that the demand for space keeps pace with house prices[4]. However, focusing on high and low-income groups within housing markets suggests, not surprisingly, that housing is most unaffordable for the lower income groups even though they buy cheaper houses. The relative affordability-gap is largest for the poorest groups in the least affordable cities. None of these calculations take account of taxes and benefits however: adjusting for these reduces the gap markedly for the least affordable cities and makes it essentially disappear for the more affordable ones. We hope future research will reveal whether the regularities we uncovered for Britain apply elsewhere.

Overall however this exercise reinforces the judgement that Demographia does a very useful job. The simple MM measure has shortcomings. It does hide some significant differences in measured post and pre-tax affordability. We find that it is important to focus on actual urban housingmarkets rather than large administrative regions in which there can be a wide range of affordability on the MM measure. But overall all our adjustments yield values highly correlated with those found in Demographia and some of the obvious worries – for example about systematic difference in the size of houses between more and less affordable markets – make a lot less difference than might have been thought. Perhaps the Demographia multiples are "only" proxy measures of affordability, but our calculations indicate they really are pretty good proxies.

Acknowledgement

We would like to thank Xiaolun Yu for his terrific effort in collecting the data and merging huge data sets on street addresses or cross walks from administrative to functional regions. The authors are responsible for remaining mistakes.

Biographical Information

All authors are in the Department of Geography and Environment at the London School of Economics and are associates of the Centre for Economic Performance working on the Urban Programme. Felipe Carozzi is an Assistant Professor of Urban Economics and Economic Geography and Paul Cheshire & Christian Hilber are both Professors of Economic Geography.

[4] This does not imply higher house prices do not make people worse off: rather that Londoners likely proportionately devote more of their incomes to housing.

From the Authors

From Wendell Cox:

We are pleased that three of the world's leading housing market experts, economists Felipe Carozzi, Paul Cheshire and Christian Hilber of the London School of Economics (LSE) have provided the Introduction to the *14th Annual Demographia International Housing Affordability Survey*.

Consistent with their substantial international work, they note the need for "good measures" of housing affordability. Moreover, their contribution is appropriate coming from Britain, which they label "the cradle of housing unaffordability."

For decades, housing costs (the largest household expenditure) and household income trends were similar in virtually all markets. Serious deterioration in housing affordability, however, accompanied adoption of British style urban containment policy. Urban containment eliminates competitive land markets, making it impossible to build low-cost middle-income housing construction on the urban periphery.

House prices have doubled or worse relative to household incomes in many urban containment markets, raising the cost of living, reducing the standard of living and increasing poverty.

For example, in the United States there is a strong relationship between severe housing unaffordability and the highest metropolitan area costs of living. *California has the highest poverty rate in the U.S*, the result of its high housing costs. By contrast, housing affordability is much better in metropolitan areas that have avoided urban containment.

There is a heavy human cost. This is most evident in rising wealth inequality, which research has tied to escalating housing costs. This contrasts with one of the great human advances of the last two centuries, the unpredented democratization of prosperity that has replaced millenia of pervasive poverty. Much of this retrogression can be traced to government land use policy (urban containment) that is associated with higher prices.

This is a travesty, and it is unnecessary. There is an imperative to restore housing affordability. The housing affordability crisis is a standard of living crisis and a poverty crisis.

From Hugh Pavletich:

My home country New Zealand is the global leader in dealing with political impediments, so that housing affordability is restored.

The public conversation to restore housing affordability began in earnest early 2005, with the release of the 1st Annual Demographia International Housing Affordability Survey .

Back in 2007, then Opposition Leader (now Sir) John Key made it clear within this interview that lack of land supply was the major problem. This has been a near 14 year process of evolutionary change, with the engagement of the public and responsible media.

In turn this has pressured politicians to respond.

Public opinion is the driver, as increasing numbers of New Zealanders better understand the true costs of unnecessary politically induced housing inflation to themselves and their wider families.

The initial advocacy phase ran through to October 2012, with the major Government announcement to focus on land supply, infrastructure financing, process and construction costs. Over recent years broader consensus (more) has taken place.

To illustrate further, just prior to Christmas 2017, Stephen Sellwood of Infrastructure New Zealand and Bill Evans of major builder Fletcher Living repeated again, that the focus must be on land supply and the appropriate debt financing of infrastructure.

We are now moving to the implementation phase, with a recent change to a centre – left Labour led reformist government. Historically in New Zealand, Labour has been the political party of reform.

More extensive information is available at my archival website Performance Urban Planning . Note in particular the Prime Minister Jacinda Ardern / Housing Minister Phil Twyford section near the top of the website, to better understand the new government's proposals to restore housing affordability.

Highlights from Previous Introductions to the *Demographia International Housing Affordability Survey*

	Oliver Hartwich, Executive Director. The New Zealand (#12: 2016)	We should not accept extreme price levels in our housing markets. High house prices are not a sign of city's success but a sign of failure to deliver the housing that its citizens need. Fortunately, the media are waking up to the realisation that housing and land supply matters. The most powerful infographic of 2016 was produced by The Wall Street Journal. It showed what happened to house prices in US cities that had expanded their residential areas between 1980 and 2010 – and those that had not. As was to be expected, greater land supply went hand in hand with lower price increases.
	Senator Bob Day, AO, Senate of Australia (#12: 2016)	The distortion in the housing market… resulting from the supply-demand imbalance is enormous … and affects every other area of a country's economy. New home owners pay a much higher percentage of their income on house payments than they should. However, the real culprit … was the refusal of … governments … to provide an adequate and affordable supply of land for new housing stock to meet demand. … the "scarcity" that drove up land prices is wholly contrived - it is a matter of political choice, not geographic reality. It is the product of restrictions imposed through planning regulation and zoning.
	Dr. Shlomo Angel, New York University (#11: 2015)	We all understand what it means to prepare adequate lands for urban expansion, enough land to accommodate both residences and workplaces, so as to ensure that land—and particularly residential land—remains affordable for all. Unfortunately, municipalities of many rapidly growing cities often underestimate the amount of land needed to accommodate urban expansion. In the minority of cases where expansion is effectively contained by draconian laws, it typically results in land supply bottlenecks that render housing unaffordable to the great majority of residents.
	Alain Bertaud, New York University (#10: 2014)	It is time for planners to abandon abstract objectives and to focus their efforts on two measurable outcomes that have always mattered since the growth of large cities during the 19th century's industrial revolution: workers' spatial mobility and housing affordability. As a city develops, nothing is more important than maintaining mobility and housing affordability. Mobility takes two forms: first, the ability to travel in less than an hour from one part of a city to another; and second, the ability to trade dwellings easily with low transactions costs.
	Hon. Bill English, Deputy Prime Minister, New Zealand *Later Prime Minister (2016-2017)* (#9: 2013)	Housing affordability is complex in the detail – governments intervene in many ways – but is conceptually simple. It costs too much and takes too long to build a house in New Zealand. Land has been made artificially scarce by regulation that locks up land for development. This regulation has made land supply unresponsive to demand.

	Robert Bruegmann, PhD, University of Illinois, Chicago (#8: 2012)	… I think it is fair to say that a growing number of people who have looked at the figures have tended to agree that a good many well-meaning policies involving housing may be pushing up prices to such an extent that the negative side-effects are more harmful than the problems the policies were intended to correct.
	Joel Kotkin, Chapman University (#7: 2011)	Although usually thought of as "progressive" in the English speaking world, the addiction to "smart growth" can more readily be seen as socially "regressive". In contrast to the traditional policies of left of center governments that promoted the expansion of ownership and access to the suburban "dream" for the middle class, today regressive "progressives" actually advocate the closing off of such options for potential homeowners.
	Dr. Tony Recsei, Save Our Suburbs, Sydney (#6: 2010)	During the 18th century, especially after the industrial revolution, rural dwellers desperate to make a living streamed into the cities, converting many areas into overcrowded slums. However, as the new economic order began to generate wealth, standards of living improved, allowing an increase in personal living space. Unless we are vigilant, high-density zealots will do their best to reverse centuries of gains and drive us back towards a Dickensian gloom.
	Dr. Shlomo Angel, New York University (#5: 2009)	For cities to expand outward at their current pace — to accommodate their growing populations or the increased demand for space resulting from higher incomes — the supply of land must not be artificially constrained. The more stringent the restrictions, the less is the housing market able to respond to increased demand, and the more likely house prices are to increase. And when residential land is very difficult to come by, housing becomes unaffordable.
	Dr. Donald Brash, Fomer Governor, Reserve Bank of New Zealand (#4: 2008)	...the affordability of housing is overwhelmingly a function of just one thing, the extent to which governments place artificial restrictions on the supply of residential land. Australia is perhaps the least densely populated major country in the world, but state governments there have contrived to drive land prices in major urban areas to very high levels, with the result that in that country housing in major state capitals has become severely unaffordable...

2007: 3rd Edition 2006: 2nd Edition 2005: 1st Edition

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14th Annual Demographia International Housing Affordability Survey

Rating Middle-Income Housing Affordability

(2018 Edition: Data from 3rd Quarter 2017)

By Wendell Cox (Demographia) & Hugh Pavletich (Performance Urban Planning)

EXECUTIVE SUMMARY

The *14th Annual Demographia International Housing Affordability Survey* covers 293 metropolitan housing markets (metropolitan areas) in nine countries (Australia, Canada, China, Ireland, Japan, New Zealand, Singapore, the United Kingdom and the United States) for the third quarter of 2017. A total of 92 major metropolitan markets (housing markets) --- with more than 1,000,000 population --- are included, including five megacities, which are defined as having more than 10,000,000 residents (Tokyo-Yokohama, New York, Osaka-Kobe-Kyoto, Los Angeles, and London).

Middle-Income Housing Affordability

The *Demographia International Housing Affordability Survey* rates middle-income housing affordability using the "Median Multiple," which is the median house price divided by the median household income. The Median Multiple is widely used for evaluating housing markets. It has been recommended by the World Bank and the United Nations and has been used by the Joint Center for Housing Studies at Harvard University. The Median Multiple and other price-to-income multiples (housing affordability multiples) are used to compare housing affordability between markets by the Organization for Economic Cooperation and Development, the International Monetary Fund, *The Economist*, and other organizations.

Table ES-1
Demographia International Housing Affordability Survey
Housing Affordability Ratings

Housing Affordability Rating	Median Multiple
Affordable	3.0 & Under
Moderately Unaffordable	3.1 to 4.0
Seriously Unaffordable	4.1 to 5.0
Severely Unaffordable	5.1 & Over
Median multiple: Median house price divided by median household income	

Historically, liberally regulated markets have exhibited median house prices that are three times or less that of median household incomes (a Median Multiple of 3.0 or less). *Demographia* uses the housing affordability ratings in Table ES-1.

Housing Affordability in 2017

There are 10 affordable major housing markets, all in the United States. There are 28 severely unaffordable major housing markets, including all in Australia (5), New Zealand (1) and China (1).

Thirteen of the major markets in the United States are severely unaffordable (out of 54), six in the United Kingdom (out of 21 major markets) and two out of Canada's six.

The most affordable major housing markets are in the United States, with a moderately unaffordable Median Multiple of 3.8, followed by Japan (4.2), Canada (4.3) and the United Kingdom (4.6). Singapore and Ireland both have Median Multiples of 4.8. The major markets of Australia (6.6), New Zealand (8.8) and China (19.4) are severely unaffordable.(Table ES-2).

There are 10 affordable major housing markets, all in the United States. Rochester is the most affordable, with a Median Multiple of 2.5, followed by Cincinnati and Cleveland (2.7), Oklahoma City, Pittsburgh and Buffalo (2.8), St. Louis and Detroit (2.9) as well as Indianapolis and Grand Rapids (3.0).

There are 26 severely unaffordable major housing markets in 2017. Again, Hong Kong is the least affordable, with a Median Multiple of 19.4 up from 18.1 last year. Sydney is again second, azt 12.9. Vancouver is third least affordable, at 12.6, followed by San Jose, with a Median Multiple of 10.3 and Melbourne, with a Median Multiple of 9.9. The least affordable 10 also includes Los Angeles (9.4), Honolulu (9.2), San Francisco (9.1), Auckland (8.8) and London (8.5). Schedule 1 includes Median Multiples for all major markets.

Table ES-2
Housing Affordability Ratings by Nation: Major Housing Markets (Over 1,000,000 Population)

Nation	Affordable (3.0 & Under)	Moderately Unaffordable (3.1-4.0)	Seriously Unaffordable (4.1-5.0)	Severely Unaffordable (5.1 & Over)	Total	Median Market
Australia	0	0	0	5	5	6.6
Canada	0	2	2	2	6	4.3
China: Hong Kong	0	0	0	1	1	19.4
Ireland	0	0	1	0	1	4.8
Japan	0	1	1	0	2	4.2
New Zealand	0	0	0	1	1	8.8
Singapore	0	0	1	0	1	4.8
United Kingdom	0	1	14	6	21	4.6
United States	10	20	11	13	54	3.8
TOTAL	10	24	30	28	92	4.2

Table ES-3 summarizes housing affordability in all markets.

Housing Affordability and the Standard of Living

Fundamentally, differences in housing affordability can virtually translate into similar differences in the standard of living. Worsening housing affordability and the resultant standard of living declines threaten one of the greatest recent human advances – the democratization of prosperity.

Virtually all the severely unaffordable major housing markets covered in the *Demographia International Housing Affordability Survey* have restrictive land use regulation, usually urban containment policy. Urban containment seeks to severely limit or prohibit new housing development on and beyond the urban fringe. A typical strategy is to impose an "urban growth boundary" which is associated with higher land prices for land on which development is allowed. This leads to higher house prices, a lower standard of living and increased poverty. Housing affordability is likely to worsen even more unless there is regulatory reform that restores competitive land markets on the urban fringe (Section 4).

Table ES-3
Housing Affordability Ratings by Nation: All Markets

Nation	Affordable (3.0 & Under)	Moderately Unaffordable (3.1-4.0)	Seriously Unaffordable (4.1-5.0)	Severely Unaffordable (5.1 & Over)	Total	Median Market
Australia	0	2	5	15	22	5.9
Canada	11	15	6	14	46	3.9
China (Hong Kong)	0	0	0	1	1	19.4
Ireland	2	2	1	0	5	3.7
Japan	0	1	1	0	2	4.2
New Zealand	0	0	2	6	8	5.8
Singapore	0	0	1	0	1	4.8
United Kingdom	0	5	18	10	33	4.5
United States	49	59	37	30	175	3.7
TOTAL	62	84	71	76	293	4.1

There are signs of progress, most recently in New Zealand. New Zealand's new government has plans to directly attack the element of urban containment policy most associated with that country's spiraling house prices. For 50 years, Singapore has achieved remarkable success from its policies that have made housing affordability a principal priority.

In her legendary book, *The Life and Death of Great American Cities,* Jane Jacobs said "...a metropolitan economy, if it is working well, is constantly transforming many poor people into middle-class people..." In her last interview, she said that "If planning helps people, they ought to be better off as a result, not worse off." Yet, urban containment policy has been associated with more expensive housing, which has lowered the standard of living, increased poverty and stunted economic growth. The focus of public policy, including planning, should be on people, rather than place.

14th Annual Demographia International Housing Affordability Survey

Rating Middle-Income Housing Affordability

(2018 Edition: Data from 3rd Quarter 2017)

By Wendell Cox (Demographia) & Hugh Pavletich (Performance Urban Planning)

1: MIDDLE-INCOME HOUSING AFFORDABILITY

The *14th Annual Demographia International Housing Affordability Survey* measures middle-income housing affordability in 92 major metropolitan housing markets[1] in Australia, Canada, Hong Kong, Ireland, Japan, New Zealand, Singapore, the United Kingdom and the United States. These include five megacities,[2] which are among the largest metropolitan areas in the world --- Tokyo-Yokohama, New York, Osaka-Kobe-Kyoto, Los Angeles, and London.[3] Among the major markets 18 have more than 5,000,000 residents, on average with a Median Multiple of 4.8 (Figure 1).

In total, the *14th Annual Demographia International Housing Affordability Survey* provides ratings for 293 housing markets located in the same nations, with data from the third quarter (September quarter) of 2017. The *Survey* provides perhaps the largest collection of housing affordability data at the housing market level in the world. House price data is obtained or estimated from sources that account for the majority of existing dwellings sold in each of the nations The data is reported at the housing market level, unmasking significant differences in housing affordability within nations.[4]

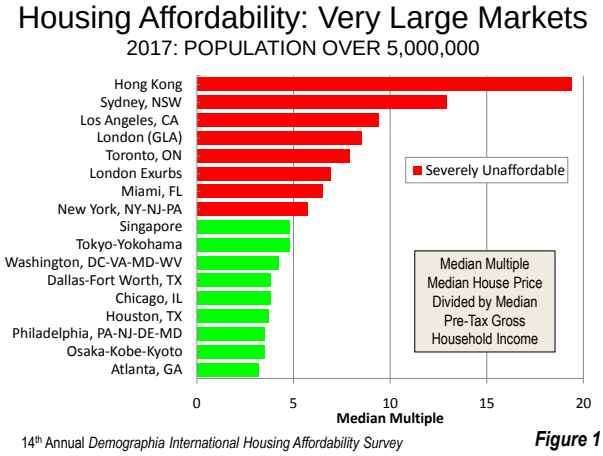

Figure 1

The *Demographia International Housing Affordability Survey* focuses on middle-income housing affordability. Middle-income housing affordability is different from low – income "affordable' housing," which requires subsidies.[5] However, this does not suggest that low-income affordable housing is less important. The requirement for low-income affordable housing in a market is determined by its middle-income housing affordability, which is the focus of the *Survey*. If middle-

[1] Metropolitan areas with more than 1,000,000 population.
[2] Metropolitan areas with more than 10 million population.
[3] Metropolitan areas are labor markets and housing markets.
[4] This is most evident in the United States, where there are many affordable housing markets and many severely unaffordable markets.
[5] Including social housing.

income housing is affordable, then more low-income households will be able to afford unsubsidized housing (Section 4).

Middle-income housing affordability is different than luxury housing affordability, which is reported upon by a number of organizations (such as the Knight Frank's *Wealth Report*). In the vernacular of this populist era, middle-income housing affordability might be characterized as relating to the "99 percent," rather than the luxury "one percent" of the market.

The requirement for low-income affordable housing in a market is determined by its middle-income housing affordability

1.1: What is Middle-Income Housing Affordability?

Housing affordability is measured by comparison of house prices to household incomes.[6] According to the United Nations,[7] "If there is a single indicator that conveys the greatest amount of information on the overall performance of housing markets, it is the house price-to-income ratio."

The *Demographia International Housing Affordability Survey*, measures middle-income housing affordability in housing markets, or metropolitan area (labor markets), which is the economic (or functional) dimension of cities.[8] Entire housing markets are used, rather than neighborhoods or parts of housing markets, because they represent the selection of housing that is locally available to households and from which businesses draw their employees.

Housing affordability is evaluated on two overall market levels, *between* housing markets (such as between Adelaide and Melbourne) and over time *within* the same housing market (such as Adelaide from 1980 to 2015).

1.2: The Median Multiple: Measuring Housing Affordability

Housing affordability cannot be evaluated except in relation to incomes.

The *Demographia International Housing Affordability Survey* uses the "Median Multiple" (median house price divided by gross pre-tax annual median household income[9]) to assess housing affordability.

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[6] See, for example, Jason Furman, *Barriers to Shared Growth: The Case of Land Use Regulation and Economic Rents,* Address to the Urban Institute, November 20, 2016. https://obamawhitehouse.archives.gov/sites/default/files/page/files/20151120_barriers_shared_growth_land_use_regulation_and_economic_rents.pdf

[7] Shlomo Angel, Stephen K. Mayo and William L. Stephens, Jr., "The Housing Indicators Program: A Report on Progress and Plans for the Future," *Netherlands Journal of Housing and the Built Environment* 8, no. 1 (1993): 13-48. http://sollyangel.com/wp-content/uploads/2013/10/38.-1993-The-Housing-Indicators-Program.pdf.

[8] The physical dimension of cities is the built-up urban area, which is surrounded by rural territory (see *Demographia World Urban Areas* (see: http://demographia.com/db-worldua.pdf). These definitions exclude the administrative unit or "municipality," which is simply a political construct that may be smaller than the metropolitan area (generally in the West) or larger (such as in China). For further information see: Paul Cheshire, Max Nathan and Henry G. Overman of the London School of Economics in their recent book, *Urban Economics and Urban Policy: Challenging Conventional Policy Wisdom*

[9] This is to be contrasted with median "family" income.

The Median Multiple is a house price to income ratio that is widely used for evaluating housing markets. It has been recommended by the World Bank[10] and the United Nations and is used by the Joint Center for Housing Studies, Harvard University.[11] Similar house price to income ratios (housing affordability multiples) are used to compare housing affordability between markets by the Organization for Economic Cooperation and Development, the International Monetary Fund, international credit rating services, media outlets (such as *The Economist*[12]) and others.

Table 1
Demographia International Housing Affordability Survey
Housing Affordability Ratings

Housing Affordability Rating	Median Multiple
Affordable	3.0 & Under
Moderately Unaffordable	3.1 to 4.0
Seriously Unaffordable	4.1 to 5.0
Severely Unaffordable	5.1 & Over
Median multiple: Median house price divided by median household income	

More elaborate indicators, which often mix housing affordability and mortgage affordability can mask the structural elements of house pricing and are often not well understood outside the financial sector. The mixed indicators provide only a "snapshot," because interest rates can vary over the term of a mortgage; however the price paid for the house does not.

Historically, the Median Multiple has been remarkably similar … with median house prices from 2.0 to 3.0 times median household incomes.

The Median Multiple is a reliable, easily understood and essential structural indicator for measuring the health of residential markets and facilitates meaningful and transparent comparisons of housing affordability. The Median Multiple provides a solid foundation for the consideration of structural policy options for restoring and maintaining housing affordability in local housing markets. The *Demographia International Housing Affordability Survey* housing affordability ratings are shown in Table 1.

Typically, severely unaffordable markets have urban containment land use policy.

1.3: The Median Multiple: Historical & International Consistency

Available data shows that house costs have generally risen at a rate similar to that of household incomes until comparatively recently. This is consistent with cost trends among other basic necessities, such as personal transport, food and clothing, which in some cases have even declined.

[10] *The Housing Indicators Program,* http://siteresources.worldbank.org/INTURBANDEVELOPMENT/Resources/336387-1169578899171/rd-hs7.htm. Also see Shlomo Angel, *Housing Policy Matters: A Global Analysis.* Oxford University Press, 2000.
[11] *Indicators of Sustainable Development: House Price-to-income Ratio*: http://esl.jrc.it/envind/un_meths/UN_ME050.htm.
[12] For example, *The Economist* publishes a housing affordability index for metropolitan areas in China (see Section 4).

Table 2
LIBERAL V. URBAN CONTAINMENT: LAND USE REGULATION CLASSIFICATIONS

The *Demographia International Housing Affordability Survey* uses the following land use regulation classifications:

Liberal Land Use Policy (Less Restrictive Markets) applies in markets not classified as having more restrictive land use regulation (where competitive land markets are permitted to operate on the urban fringe). In these markets, residential development is allowed to occur based upon consumer preferences, subject to basic environmental regulation.[13] Generally, liberal land use regulation is "demand-driven" Land is allowed to be developed, except in limited areas, such as parks and environmentally sensitive areas. By allowing development on the urban fringe, liberal land use regulation allows the "supply vent" to operate, which keeps house prices affordable. Less restrictive regulation can also be called *traditional* or *liberal* regulation. In addition to lower housing costs relative to incomes, the lower population densities typical of liberal markets are associated with less intense traffic congestion and shorter average work trip journey times. Liberal land use regulation has also been called "traditional" regulation.

Urban Containment Policy (More Restrictive Markets) uses urban containment[14] or other mechanisms (such as comprehensive plans or development limits) to such an extent that the competitive market for land is not permitted to operate on the urban fringe. More restrictive land use regulation seeks to outlaw the liberal regulation that produced middle-income housing affordability.

Urban containment are the most important of more restrictive land use regulation. Generally, urban containment regulation is "plan-driven," as planning departments and governments determine where new housing is allowed to be built. There is a "negative presumption," with new development generally prohibited, except in limited areas where it is permitted by government plans. Typically, urban containment policies include urban containment boundaries and related variations (such as urban growth boundaries, green belts, urban service districts, "growth areas" and other strategies that substantially reduce the amount of land available for house building. Urban containment policy may also be characterized by terms such as "densification policy," "compact development", or "urban consolidation", and is an important strategy of "growth management" or "smart growth."

By severely limiting or even prohibiting development on the urban fringe, urban containment eliminates the "supply vent" of urban fringe development, by not allowing the supply of housing to keep up with demand, except at prices elevated well above historic norms.

Urban containment policies are often accompanied by costly development impact fee regimes that disproportionately charge the cost of the necessary infrastructure for growth on new house buyers. There is particular concern about the cost increasing impacts of these fees and levies, especially in Australia, Canada (Canada Mortgage and Housing Corporation), New Zealand (New Zealand Productivity Commission) and California.

Classification of Major Markets: The classification of major markets (metropolitan areas with more than 1,000,000 population) is described in the Annex and in Figure 4.

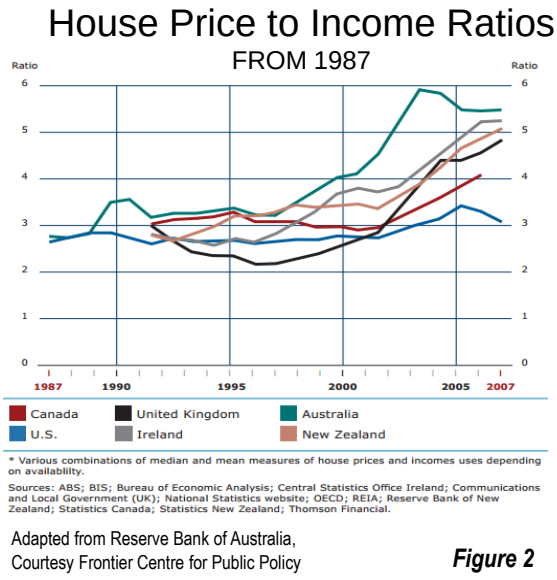
Historically, the Median Multiple has been remarkably similar among six surveyed nations, with median house prices from 2.0 to 3.0 times median household incomes (Australia, Canada, Ireland, New Zealand, the United Kingdom and the United States). Housing affordability remained generally within this range until the late 1980s or late 1990s in each of these nations (Figure 2).[15] In recent decades, house prices have escalated far above household incomes in many parts of the world. In some metropolitan markets house prices have doubled, tripled or even quadrupled relative to

[13] Liberal land use policy may vary widely, from the near deregulation in some areas of Texas to the "light-handed" zoning regulations operating throughout much of the rest of the United States.
[14] Called urban consolidation in Australia.
[15] Anthony Richards, *Some Observations on the Cost of Housing in Australia,* Address to 2008 Economic and Social Outlook Conference The Melbourne Institute, 27 March 2008 http://www.rba.gov.au/speeches/2008/sp-so-270308.html. This research included all nations covered in the *Demographia International Housing Affordability Survey* except for Ireland. The Richards research is also illustrated in the of the National Housing Council of Australia, http://www.fahcsia.gov.au/sa/housing/pubs/housing/national_housing_supply/Documents/default.htm (Figure 1.1).

household incomes. Typically, the housing markets rated "severely unaffordable" have more restrictive land use policy, usually "urban containment" (Table 2).

Median Multiples of 3.0 or less continue to be observed in some markets of the United States, Canada and Ireland.[16] Definitive historical data has not been identified for Hong Kong, Japan or Singapore.

The *Demographia International Housing Affordability Survey* has been published for 14 years to emphasize the importance of well functioning housing markets. More severely unaffordable housing is strongly correlated with higher overall costs of living and thus lower standards of living between housing markets. Yet, higher standards of living and lower poverty rates are principal domestic policy priorities in virtually all nations. This requires attention to housing affordability (Section 4).



Adapted from Reserve Bank of Australia,
Courtesy Frontier Centre for Public Policy

Figure 2

2: HOUSING AFFORDABILITY IN 2017: INTERNATIONAL SUMMARY

The *14th Annual Demographia International Housing Affordability Survey* provides housing affordability ratings for 92 major housing markets (over 1,000,000 population) and an overall total of 293 markets. Markets in 9 nations are rated.

2.1: Major Housing Markets

There was a reduction in the number of affordable major housing markets from 11 to 10 in 2017. At the same time, the number of severely unaffordable major housing markets dropped from 29 to 28.

Five of the markets rated by the UBS Global Real Estate Bubble Index as having the greatest bubble risk are included in the *14th Annual Demographia International Housing Affordability Survey,* each with severely unaffordable ratings. This includes Toronto, Vancouver, Sydney, London and Hong Kong. Major market data is summarized in Schedule 1, with additional information in Schedule 3.

For the fifth year in a row, the United States has the most affordable housing among major housing markets, a moderately unaffordable Median Multiple of 3.8. Japan has an Average Multiple of 4.2, Canada (4.3) the United Kingdom (4.5), Singapore (4.8) and Ireland (4.8) have seriously unaffordable housing.

[16] A value below 2.0 is affordable, but may indicate depressed economic conditions.

Three national markets are severely unaffordable, with Median Multiples of 5.1 or above. These include China (Hong Kong), with a Median Multiple of 19.4, New Zealand, at 8.8 and Australia at 6.6. The trend in annual major housing market Median Multiples are shown in Figure 3. Ireland, Japan and Singapore are the only nations with no severely unaffordable major housing markets in this year's *Survey* (Table 3).

Table 3
Housing Affordability Ratings by Nation: Major Housing Markets (Over 1,000,000 Population)

Nation	Affordable (3.0 & Under)	Moderately Unaffordable (3.1-4.0)	Seriously Unaffordable (4.1-5.0)	Severely Unaffordable (5.1 & Over)	Total	Median Market
Australia	0	0	0	5	5	6.6
Canada	0	2	2	2	6	4.3
China: Hong Kong	0	0	0	1	1	19.4
Ireland	0	0	1	0	1	4.8
Japan	0	1	1	0	2	4.2
New Zealand	0	0	0	1	1	8.8
Singapore	0	0	1	0	1	4.8
United Kingdom	0	1	14	6	21	4.6
United States	10	20	11	13	54	3.8
TOTAL	10	24	30	28	92	4.2

Most Affordable Major Housing Markets: The 10 affordable major housing markets are all in the United States (Table 4). Rochester is the most affordable, with a Median Multiple of 2.5. Cincinnati and Cleveland have a Median Multiple of 2.7. Buffalo, Oklahoma City and Pittsburgh have a Median Multiple of 2.8, Detroit and St. Louis have a Median Multiple of 2.9, while Grand Rapids and Indianapolis have a Median Multiple of 3.0, while Buffalo ranks second with a Median Multiple of 2.6. There is a three-way tie for third most affordable between Cincinnati, Cleveland and Pittsburgh, with Median Multiples of 2.7. Oklahoma City and St. Louis have Median Multiples of 2.9. Four major housing markets have affordable Median Multiples of 3.0, Detroit, Grand Rapids, Indianapolis and Kansas City. These affordable markets have liberal land use regulation (Table 2, above).

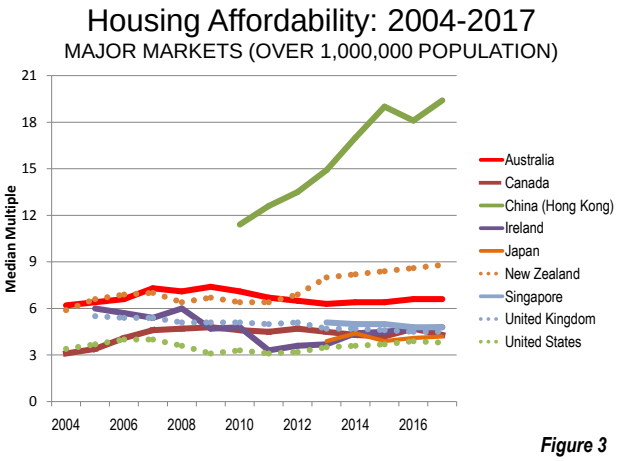


Figure 3

Least Affordable Major Housing Markets: The severely unaffordable major markets include all in Australia (5), New Zealand (1) and China (1). Two of Canada's six markets are severely unaffordable. Six of the 21 major markets in the United Kingdom are severely unaffordable, and 13 of the 54 markets in the United States.

The 10 least affordable major housing markets are shown in Table 7. Hong Kong has least affordable housing, with a Median Multiple of 19.4, the least affordable Median Multiple yet recorded. For the eighth year in a row, Hong Kong has had the worst housing affordability in the *Demographia International Housing Affordability Survey*.

Table 4
Affordable Major Housing Markets

Rank	Nation	Metropolitan Market	Median Multiple
1	U.S.	Rochester, NY	2.6
2	U.S.	Cincinnati, OH-KY-IN	2.7
2	U.S.	Cleveland, OH	2.7
4	U.S.	Buffalo, NY	2.8
4	U.S.	Oklahoma City, OK	2.8
4	U.S.	Pittsburgh, PA	2.8
7	U.S.	Detroit, MI	2.9
7	U.S.	Saint Louis, MO-IL	2.9
9	U.S.	Grand Rapids, MI	3.0
9	U.S.	Indianapolis, IN	3.0

Sydney is again the second least affordable market, with a 12.9 Median Multiple, the highest ever recorded outside Hong Kong in the *Demographia International Housing Affordability Survey*. Vancouver remains the third least affordable major housing market, with a Median Multiple of 12.6.

The least affordable 10 in major market housing affordability is rounded out by San Jose (10.3), Melbourne (9.9), Los Angeles (9.4), Honolulu (9.3), San Francisco (9.1) and Auckland (8.8)[17] The severely unaffordable major housing markets are shown in Table 5.

Hong Kong is the least affordable market for the 8th consecutive year

Table 5
Severely Unaffordable Major Housing Markets (Least Affordable)

Rank	Nation	Metropolitan Market	Median Multiple	Rank	Nation	Metropolitan Market	Median Multiple
65	U.K.	Leicester & Leicestershire	5.2	79	U.K.	London Exurbs (E & SE England)	6.9
66	U.S.	Sacramento, CA	5.3	80	U.K.	Bournemouth & Dorsett	7.3
67	U.S.	Boston, MA-NH	5.5	81	Canada	Toronto, ON	7.9
67	U.S.	Portland, OR-WA	5.5	82	U.S.	San Diego, CA	8.4
69	U.S.	Denver, CO	5.7	83	U.K.	London (Greater London Authority)	8.5
69	U.S.	New York, NY-NJ-PA	5.7	84	N.Z.	Auckland	8.8
69	U.S.	Riverside-San Bernardino, CA	5.7	85	U.S.	San Francisco, CA	9.1
72	Australia	Perth, WA	5.9	86	U.S.	Honolulu, HI	9.2
72	U.S.	Seattle, WA	5.9	87	U.S.	Los Angeles, CA	9.4
74	U.K.	Plymouth & Devon	6.1	88	Australia	Melbourne, VIC	9.9
75	Australia	Brisbane, QLD	6.3	89	U.S.	San Jose, CA	10.3
76	U.S.	Miami, FL	6.5	90	Canada	Vancouver, BC	12.6
77	Australia	Adelaide, SA	6.6	91	Australia	Sydney, NSW	12.9
78	U.K.	Bristol-Bath	6.8	92	China	Hong Kong	19.4

The housing affordability performance and general regulatory structure (urban containment or equivalent versus liberal land use policy) is illustrated for the largest markets in Figure 4.

[17] Auckland's lower Median Multiple in 2017 is principally due to a restatement of median household incomes by Statistics New Zealand. See Section 3.6.

2.2: All Housing Markets

Among the 293 markets, Ireland and the United States have the most affordable housing with a national Median Multiples of 3.7 (moderately unaffordable). Canada is third at 3.9 and is followed by Japan, which at 4.1 has a seriously unaffordable rating. The United Kingdom (4.5) and Singapore (4.8) are rated seriously unaffordable. The least affordable markets are China (Hong Kong), at 19.4, Australia (6.3) and New Zealand (5.8), each severely unaffordable (Figure 5).

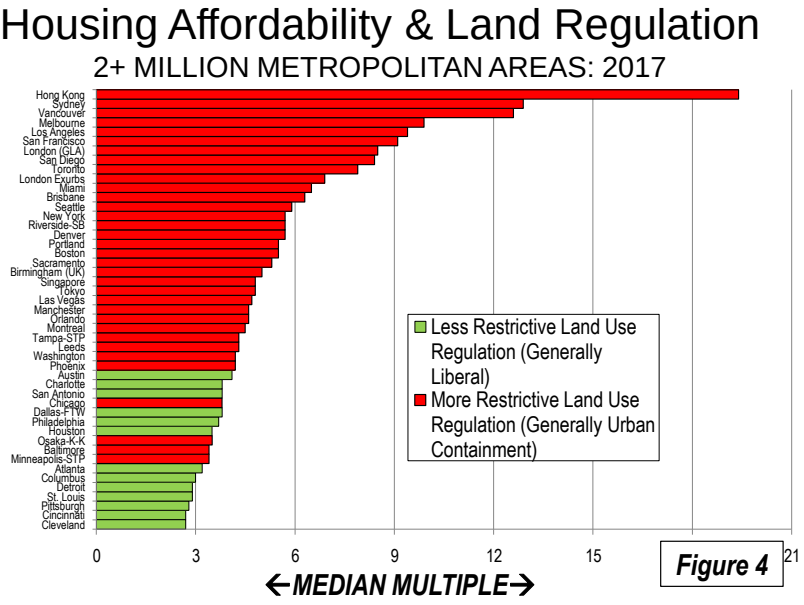


Figure 4

Among all markets, 63 are affordable (Median Multiple of 3.0 or less). There are 84 moderately unaffordable markets (Median Multiple of 3.1 to 4.0) and 71 seriously unaffordable markets (Median Multiple of 4.1 to 5.0). A total of 76 markets are severely unaffordable, with a Median Multiple of 5.1 or higher.

All 293 housing markets are ranked by housing affordability in Schedule 2 and listed alphabetically in Schedule 3. The 63 affordable markets (having a Median Multiple of 3.0 or below) are in Ireland (3), Canada (11) and the United States (49). There are no affordable markets in Australia, China (Hong Kong), Japan, New Zealand, Singapore or the United Kingdom (though such affordability was typical of virtually all markets in the past).

Table 6
All Housing Markets: 10 Most Affordable

Rank	Nation	Metropolitan Market	Median Multiple
1	U.S.	Youngstown, OH-PA	1.9
2	Canada	Moncton, NB	2.1
2	U.S.	Utica, NY	2.1
4	Canada	Fort McMurray, AB	2.2
4	Canada	Fredericton, NB	2.2
4	Ireland	Limerick	2.2
4	U.S.	Peoria, IL	2.2
8	Canada	Saint John, NB	2.3
8	U.S.	Scranton-Wilkes Barre, PA	2.3
10	U.S.	Cedar Rapids, IA	2.4
10	U.S.	Davenport, IA-IL	2.4
10	U.S.	Rockford, IL	2.4
10	U.S.	Syracuse, NY	2.4

Table 7
All Housing Markets: 10 Least Affordable

Rank	Nation	Metropolitan Market	Median Multiple
283	U.S.	Salinas-Monterey, CA	9.1
283	U.S.	San Francisco, CA	9.1
285	U.S.	Honolulu, HI	9.2
286	U.S.	Los Angeles, CA	9.4
286	U.S.	Santa Barbara, CA	9.4
288	Australia	Melbourne, VIC	9.9
289	U.S.	San Jose, CA	10.3
290	U.S.	Santa Cruz, CA	10.4
291	Canada	Vancouver, BC	12.6
292	Australia	Sydney, NSW	12.9
293	China	Hong Kong	19.4

Canada has five of the nine most affordable markets. The United States has eight entries in the top 13, with Youngstown, Ohio the most affordable, at 1.9. Moncton, New Brunswick and Utica, New York are for second most affordable, at a 2.1 Median Multiple. Ireland's Limerick is tied with three other housing markets for the fourth most affordable position, at 2.2, joined by Canada's Fort McMurray, Alberta, and Fredericton, New Brunswick and Peoria, Illinois in the United States (Table 6).

Among the 76 severely unaffordable markets, 30 are in the United States, 16 in Australia, 15 in Canada, 10 in the United Kingdom, seven in Canada, six in New Zealand and one in China.

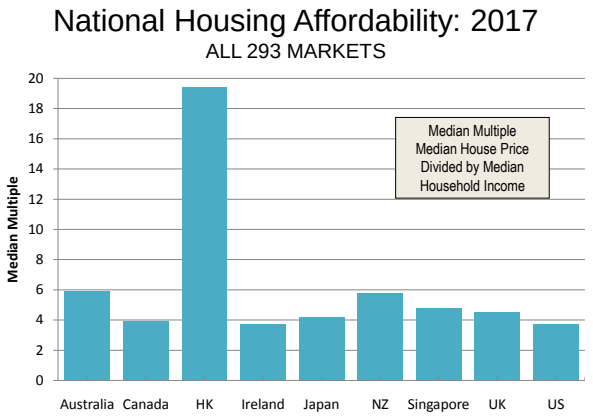


Figure 5

Among the 10 least affordable housing markets, seven are major housing markets. The least affordable 10 also includes Santa Cruz (10.4) in the San Francisco Bay area as well as Santa Barbara, California at 9.4 and Salinas-Monterey, at 9.1 (Table 7).

Table 8 summarizes housing affordability ratings by nation for all 293 markets.

Table 8
Housing Affordability Ratings by Nation: All Markets

Nation	Affordable (3.0 & Under)	Moderately Unaffordable (3.1-4.0)	Seriously Unaffordable (4.1-5.0)	Severely Unaffordable (5.1 & Over)	Total	Median Market
Australia	0	2	5	15	22	5.9
Canada	11	15	6	14	46	3.9
China (Hong Kong)	0	0	0	1	1	19.4
Ireland	2	2	1	0	5	3.7
Japan	0	1	1	0	2	4.2
New Zealand	0	0	2	6	8	5.8
Singapore	0	0	1	0	1	4.8
United Kingdom	0	5	18	10	33	4.5
United States	49	59	37	30	175	3.7
TOTAL	62	84	71	76	293	4.1

3: HOUSING AFFORDABILITY IN 2017: NATIONAL SUMMARIES

The housing affordability situation is summarized by nation below. The housing affordability data for each housing market is ranked in Schedule 1 for the major markets and Schedule 2 for all markets. Schedule 3 lists all markets, alphabetically, with additional data.

3.1: Australia

Again, as in each of the previous 13 *Demographia International Housing Affordability Surveys* all of Australia's five major housing markets are severely unaffordable (Figure 6)[18] The overall major housing market Median Multiple is a severely unaffordable 6.6 and is less affordable than all major markets except for Hong Kong.

Sydney is again the second least affordable market, with a 12.9 Median Multiple, the highest ever recorded outside Hong Kong

Major Markets: Sydney is again Australia's least affordable market, with a Median Multiple of 12.9, and ranks second worst overall, trailing Hong Kong. Sydney's housing affordability has worsened by the equivalent of 6.6 years in pre-tax median household income since 2001. This is a more than doubling of the Median Multiple. In contrast, Sydney's housing affordability worsen less than one-fourth as much between 1981 and 2001.

At 12.9 Sydney's Median Multiple is the poorest major housing affordability ever recorded by the *Survey* outside Hong Kong. Additionally, the UBS Global Real Estate Bubble Index rates Sydney as having the world's fourth worst housing bubble risk (tied with Vancouver).[19]

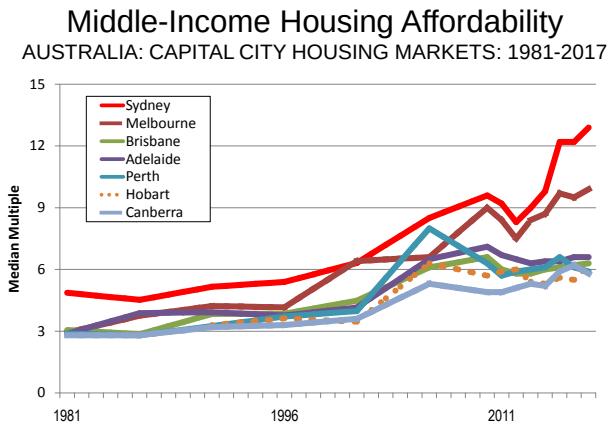


Figure 6

Melbourne has a Median Multiple of 9.9 and is the fifth least affordable major housing market internationally. Only Hong Kong, Sydney, Vancouver, and San Jose are less affordable than Melbourne. Melbourne's Median Multiple has deteriorated from 6.3 in 2001 and under 3.0 in the early 1980s. Just since 2001, median house prices have increased the equivalent of more than three years in pre-tax median household income.

[18] House price data for Australia is estimated or obtained from multiple sources, such as the Real Estate Industry Association of Queensland (*Queensland Market Monitor*), the Real Estate Institute of Victoria, the Real Estate Institute of South Australia, the Real Estate Institute of Western Australia, Australian Property Monitors, the Real Estate Institute of Australia and various real estate internet web sites. House price data for some smaller markets is year to date data. Household income data has been recalibrated based on results from the 2016 census.

[19] Toronto is rated with the worst housing "bubble risk," followed by Stockholm and Munich (the latter two are not rated in the *Demographia Survey*).

Adelaide has a severely unaffordable 6.6 Median Multiple and is the 16th least affordable of the 92 major markets. Brisbane has a Median Multiple is 6.2 and is ranked 18th least affordable, while Perth, with a Median Multiple of 5.9 is the 21st least affordable major housing market in Australia.

Other Housing Markets: Overall, Australia's 22 housing markets[20] have a severely unaffordable Median Multiple of 5.9. The most affordable markets are moderately affordable, Gladstone, Queensland at 3.2 and Rockhampton, Queensland at 3.9. There are no affordable or moderately affordable markets in Australia.

Overall 15 markets in Australia are rated severely unaffordable. The least affordable are the Sunshine Coast, Queensland (9.0) and the Gold Coast, Queensland-New South Wales (8.4).

Historical Context: Australia's generally unfavorable housing affordability is in significant contrast to the broad affordability that existed before implementation of urban containment (called urban consolidation in Australia). As is indicated in Figure 2 the price-to-income ratio in Australia was below 3.0 in the late 1980s. All of Australia's major markets have urban containment policy and all have severely unaffordable housing.

3.2: Canada

House prices have been rising well above the economic fundamentals in Canada for at least a decade. Both international and national organizations have expressed concern about the damage that Canada's rising prices (some suggest a "housing bubble") could do to the national economy.[21] According to the Canada Mortgage and Housing Corporation (CMHC) there has been "strong evidence of problematic conditions for Canada overall. Home prices have risen ahead of economic fundamentals such as personal disposable income and population growth, resulting in overvaluation in many Canadian housing markets." A 2016 Frontier Centre for Public Policy research report reviewed the strongly rising house prices relative to incomes in 35 markets across the nation.[22]

Major Housing Markets: Overall, Canada's six major markets have a seriously unaffordable Median Multiple of 4.3 (Figure 7)

Vancouver's Median Multiple is the third worst in Survey history. Only Hong Kong and Sydney have been more unaffordable

Vancouver is the least affordable market in Canada, with a Median Multiple of 12.6. This is the third worst housing affordability for a major market in the 14 years of the *Demographia International Housing Affordability Survey,* with only Hong Kong and Sydney posting less

[20] Fewer markets were included from Australia than in the past due to more limited data.
[21] See, for example, Organisation for Economic Co-operation and Development, "OECD Economic Surveys Canada," June 2014. http://www.oecd.org/eco/surveys/Overview%20_CANADA_2014.pdf. International Monetary Fund, "2014 Article IV Consultation – Staff Report; Staff Statement; and Press Release," *IMF Country Report No. 15/22,* January 2015. https://www.imf.org/external/pubs/ft/scr/2015/cr1522.pdf, Bank of Canada, "Financial System Review – December 2015." http://www.bankofcanada.ca/2015/12/fsr-december-2015/.
[22] Wendell Cox and Ailin He (2016), *Canada's Middle-Income Housing Affordability Crisis*, Frontier Centre for Public Policy, https://fcpp.org/wp-content/uploads/2016/06/Cox-He-Middle-Income-Housing-Crisis.pdf.

affordable Median Multiples . Vancouver has experienced the greatest housing affordability deterioration among major markets in the *Demographia Annual International Housing Affordability Survey*, with its Median Multiple rising by more than 2.35 times, from 5.3 in 2004 to 12.6 in 2017. The 2017 UBS Global Real Estate Bubble Index rates Vancouver as tied (with Sydney) for the fourth worst housing "bubble risk" in the world.

Vancouver had already developed a severely unaffordable housing market in the first *Survey* (2004), which has been associated with its urban containment policy, adopted about five decades ago. Vancouver has experienced the greatest housing affordability deterioration among major markets in the *Demographia Annual International Housing Affordability Survey*, with its Median Multiple deteriorating from 5.3 to 12.6, equivalent to 7.3 years of pre-tax median household income.

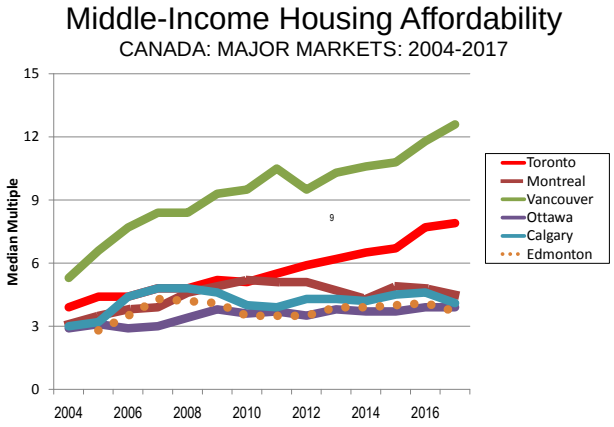


Figure 7

The Province of British Columbia imposed a foreign buyers' tax in middle 2016, hoping to reduce demand and bring upward spiraling house prices under control. This appears to have cooled the hyper-inflation at least temporarily. However, house prices are now rising again, with an 11 percent increase over the past year, approximately four times the increase in average earnings.[23] Price have been the smallest in most expensive housing, single detached housing (three percent), much of it beyond the reach of most middle-income households. Prices at the middle of the market and lower ends of the market rose much more, 15 percent in townhouses and 22 percent in apartment condominiums.

Toronto also has a severely unaffordable housing market, with its Median Multiple deteriorating to 7.9, compared 3.9 in the first *Survey* (2004). The income-adjusted median house price has increased the equivalent of four years in pre-tax median household income. The 2017 UBS Global Real Estate Bubble Index rates Toronto as having the *worst* housing "bubble risk" in the world.

Over 14 years, Toronto's house prices have doubled in relation to household incomes.

Ryerson University researchers have responded to the serious housing affordability concerns by proposing a substantial expansion of the lower density ground oriented housing (detached and attached) preferred by the market.[24] Current policy is skewed against the development of such housing.

[23] Increase in Real Estate Board of Greater Vancouver benchmark price compared to increase in British Columbia average weekly earnings.
[24] Frank Clayton (2017), "Countering Myths about Rising Ground-Related Housing Prices in the GTA: New Supply Really Matters," Centre for Urban Research and Land Development Ryerson University 2017

In Toronto, the housing affordability loss has been associated with the middle-2000s adoption of urban containment policy ("Places to Grow"), including a Green Belt and other draconian restrictions. A *Survey* co-author predicted would lead to much worsened housing affordability.[25]

A foreign buyers' tax (the "Non-Resident Speculation Tax") was imposed by the Province of Ontario in the second quarter of 2017. As in Vancouver, the hyper-inflationary price increases were stopped. The cooling effect of the tax was most evident in the highest cost segment, detached houses. Also, like Vancouver, price increases were greatest in the lowest cost segment, apartment condominiums, where prices rose 23 percent in the year ended September.

Montréal has seriously unaffordable housing (4.5), having deteriorated from a moderately unaffordable 3.1 in 2004. Calgary's seriously unaffordable housing has a Median Multiple of 4.1, compared to an affordable 3.0 in 2004. as does Calgary (4.1). Ottawa-Gatineau is moderately unaffordable, at 3.9, deteriorating from an affordable 2.9 in 2004. Canada's most affordable major market is Edmonton (3.7), which is rated as moderately unaffordable. This is a deterioration from the affordable 2.8 Median Multiple in 2005, Edmonton's first *Survey*.

Other Housing Markets: The overall Median Multiple for the 46 markets in Canada is a moderately unaffordable 3.9.

For the sixth year in a row, Moncton (NB) was the most affordable market in Canada.

For the sixth year in a row, Moncton (NB) is the most affordable market in Canada. Moncton, with a Median Multiple of 2.1, and is an affordable market. Fredericton (NB) and Fort McMurray (AB) have affordable Median Multiples of 2.2 and St. John (NB) has a Median Multiple of 2.3. There are seven other affordable markets.

As in California, severely unaffordable housing seems to be spreading from the major markets to nearby markets. Severely unaffordable housing has spread from Vancouver to the British Columbia markets of Victoria (8.1), Nanaimo (7,2), the Fraser Valley (7.1), Chilliwack (6.8) and Kelowna (6.6).

Markets near Toronto have also become severely uaffordable, such as Hamilton (6.6) and Oshawa (5.7). In Ontario's hyper-inflation of the last year, Guelph (6.0), Barrie (5.9), Kitchener-Waterloo (5.5), and St. Catharines-Niagara (5.2) all became severely unaffordable, with Kitchener-Waterloo, Guelph and St. Catharine-Niagara adding more than the equivalent of one-year's pre-tax median household income to the price of houses. Cambridge, not rated before, is also severely unaffordable.

The RBC Economics Affordability Measure: The *RBC Economics Housing Affordability Report* illustrates the financial difficulties faced by middle-income households in Canada's severely unaffordable markets. RBC found that the median income Vancouver household would 121 of its pre-tax gross income for monthly payments on the average priced single detached house (a typical house in Canada), and the Toronto household 94 percent. In both Vancouver and Toronto, the

[25] Wendell Cox (2004), *Myths about Urban Growth and the Toronto Greenbelt,* Fraser Institute.

household cost of even the least expensive housing, apartment condominiums is well above widely accepted 30 percent maximum guideline (Figure 8).

The report also indicates that, on average, the average Canadian median income household would pay more than 30 percent of their income for the average priced house (49 percent) as well as in Montréal, Calgary, and Ottawa-Gatineau. The problem extends to the other markets as well. In Victoria, the RBC Economics Affordability Measure is above 60, and over 30 in Saskatoon, Winnipeg, Quebec (City) and Halifax.

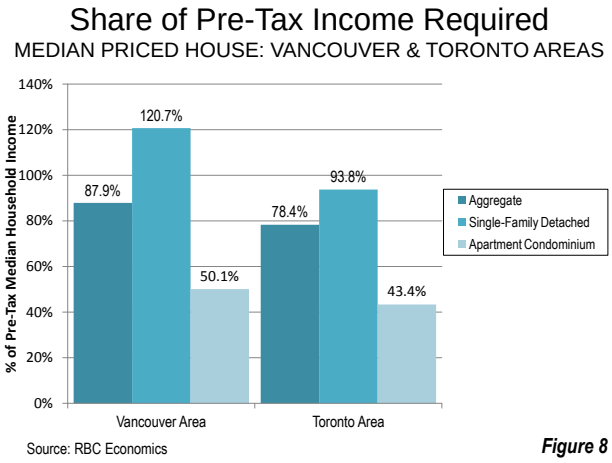


Figure 8

Historical Context: Until fairly recently, most of Canada had been characterized by house prices that were affordable. From the early 1970s to the first *Demographia International Housing Affordability Surveys* (2004 and 2005 housing affordability was maintained or improved in the major markets. The exception was Vancouver, with its long-standing urban containment policy. Since the middle 2000s, rapidly escalating prices have been associated with wider adoption of urban containment policies.

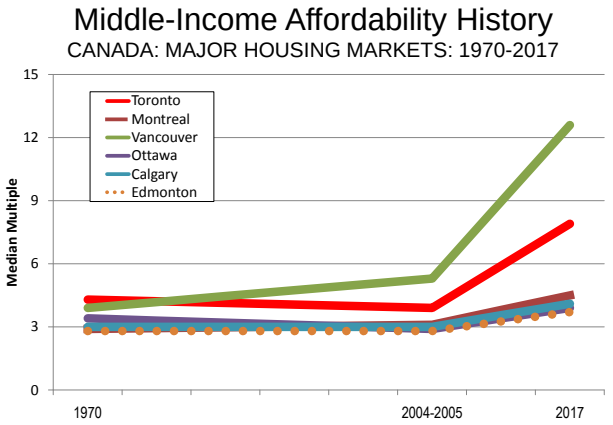


Figure 9

Even in Vancouver, the deterioration in housing affordability has accelerated over the past 13 years (7.6 years of pre-tax median household income) was more than five times that of the 1.4 years deterioration observed in the previous three decades (Figure 9).

3.3: China

Hong Kong is China's only market in the *Demographia International Housing Affordability Survey*. Hong Kong has the least affordable housing for the eighth straight year, with a Median Multiple of 19.4.[26] This is the highest Median Multiple ever reported in the *Survey,* having risen from 18.1 last year.

Hong Kong's Median Multiple of 19.4 is the highest in the history of the Demographia Survey

The UBS Global Real Estate Bubble Index rates Hong Kong as having the world's seventh worst housing bubble risk.

[26] Estimated from Hong Kong Residential Units Consideration Range and Hong Kong Private Domestic Price Index.

Historical Context: Hong Kong's housing affordability was far better in the early 2000's. According to *The Chinese University of Hong Kong's' Quality of Life Index* the price-to-income ratio rose from 4.6 in 2002 and peaked at 15.7 in 2015, based on a 39.9 square meter apartment (430 square feet). Academic research has indicated that Hong Kong's house prices have been driven higher by restrictive land-use regulation.[27]

3.4: Ireland

Overall, Ireland's Median Multiple is a moderately unaffordable 3.7, tied for the best housing affordability with the United States.

Major Housing Market: Dublin is Ireland's only major metropolitan area market and has a seriously unaffordable Median Multiple, of 4.8. This is up nearly 50 percent from 3.3 in 2011.[28]

Other Housing Markets: Galway (4.0) and Cork (3.7) are moderately unaffordable, while Waterford (2.7) and Limerick (2.2) are rated affordable.

Historical Context: As is indicated in Figure 1, Ireland had a price-to-income multiple of less than 3.0 in the early 1990s.

3.5: Japan

The Average Multiple (average house price divided by average household income) is used for the markets in Japan.[29] Japan has a seriously unaffordable major market Median Multiple of 4.2.

Major Housing Markets: Data is available for only two of Japan's major housing markets: Tokyo-Yokohama and Osaka-Kobe-Kyoto. Tokyo-Yokohama is the world's largest urban area (38 million).[30] The metropolitan area covers all or part of four prefectures, Tokyo,[31] as well as largely suburban Kanagawa, Saitama and Chiba.

Tokyo-Yokohama and Osaka-Kobe-Kyoto continue to have the best housing affordability of any megacities (over 10 million residents)

Osaka-Kobe-Kyoto ranks as the 14th largest urban area in the world (17 million) and the third largest housing market covered in the *Demographia International Housing Affordability Survey* (After

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[27] C. M. Hui & F. K. Wong (n.d.), "Dynamic Impact of Land Supply on Population Mobility with Evidence from Hong Kong," http://www.prres.net/Papers/Hui_Dynamic_impact_of_land_supply_on_population_mobility.pdf.
[28] Median house prices are calculated from the Residential Price Register. Household incomes have been recalibrated.
[29] Data for calculating Median Multiples is not available. The Average Multiple is generally comparable to the Median Multiple in the United States and Canada (see the *10th Annual Demographia Housing Affordability Survey*).
[30] *Demographia World Urban Areas,* http://demographia.com/db-worldua.pdf.
[31] Tokyo prefecture is called the Tokyo metropolis, which can be misleading, because the prefecture has only one-third of the metropolitan area population. The failure to understand this distinction has resulted in invalid demographic analyses, not only popular but also academic. The 23 wards of the former city of Tokyo are within the prefecture of Tokyo and comprise approximately 70 percent of its population.

Tokyo and New York). Osaka-Kobe-Kyoto covers all or part of Osaka, Hyogo, Kyoto and Nara prefectures.[32]

Osaka-Kobe-Kyoto is the most affordable megacity (over 10 million population) in the *Survey*, with an Average Multiple of 3.5, earning a moderately unaffordable rating. Osaka-Kobe-Kyoto is also the most affordable major housing market outside the United States, ranking 19th out of 92. Tokyo-Yokohama is the second most affordable megacity in the *Survey*, with a seriously unaffordable Average Multiple of 4.8.

Historical Context: Historical price-to-income multiple data has not been identified for Japan.

3.6: New Zealand

New Zealand's housing affordability indicates an improvement that largely due to an upward restatement of median for the last decade by Statistics New Zealand.[33] Even so, New Zealand's housing remains severely unaffordable, with a Median Multiple of 5.8.

Auckland has been severely unaffordable in all 14 Demographia Surveys

Major Housing Market: Auckland, New Zealand's only major housing market has a severely unaffordable 8.8 Median Multiple. Housing affordability has deteriorated from a Median Multiple of 5.9 in the first *Survey* (2004), thus adding the equivalent of nearly three years in pre-tax median household income to the house prices. Auckland[34] is the ninth least affordable among the 92 major housing markets, and has been severely unaffordable in all 14 *Demographia International Housing Affordability Surveys.*[35]

Other Housing Markets: There is severely unaffordable housing in the two largest markets outside Auckland. Christchurch has a Median Multiple of 5.4, while Wellington is at 5.5.

Housing Affordability and Public Policy: Outside Singapore, New Zealand is the only nation in the *Survey* demonstrating a serious public policy priority to restore and maintain middle-income housing affordability. In New Zealand, as in Australia, housing had been affordable until approximately a quarter century ago. However, urban containment policies were adopted across the country, and consistent with the international experience, housing became severely unaffordable in all three of New Zealand's largest housing markets, Auckland, Christchurch and Wellington (Figure 10).

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[32] See *Demographia World Urban Areas: 2016*, http://demographia.com/db-worldua.pdf.
[33] The national median household income was restated to show a 25 percent increase, instead of a 10 percent increase from the census year of 2013 to 2017. See: "Household income and housing-cost statistics: Year ended June 2017 corrected" (December 7, 2017), https://www.stats.govt.nz/news/household-income-and-housing-cost-statistics-year-ended-june-2017-corrected.
[34] The city of Auckland governs virtually the entire metropolitan area (housing market area or labor market area). Auckland and Honolulu are unique among metropolitan areas of more than 1,000,000 in being governed by a single local authority.
[35] Median house prices are from the Real Estate Institute of New Zealand. Household incomes have been recalibrated as a result of the income restatement by Statistics New Zealand.

Meanwhile, public opinion placed the issue of housing affordability to the top of the policy agenda in the last three national elections. In the 2017 election, the opposition Labour Party unveiled a focused housing affordability program and was able to form a ruling coalition with two other parties. The resulting Sixth Labour Government intends to increase housing supply throughout Auckland, including both urban fringe and infill development. Critically, the government intends to implement affordable infrastructure financing options for new development.

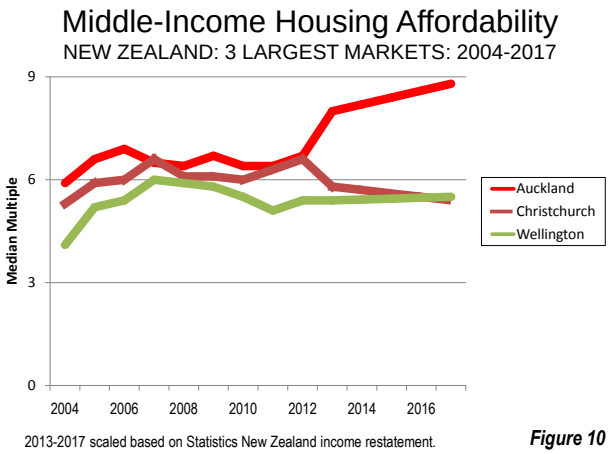


Figure 10

These developments build on other recent developments, especially a Productivity Commission of New Zealand report, which found that land use authorities have a responsibility to provide "capacity to house a growing population while delivering a choice of quality, affordable dwellings of the type demanded …."[36]

Consistent with that finding, the Productivity Commission proposed a measure that would automatically expand the supply of greenfield land when housing affordability targets are not met. The Commission said, "Where large discontinuities emerge between the price of land that can be developed for housing and land that cannot be developed, this is indicative of the inadequacy of development capacity being supplied within the city." The Productivity Commission expansion of greenfield land for development where the difference between land prices on either side of an urban containment boundary become too great.[37]

The new Labour government plans to increase supply and develop affordable infrastructure financing options for new development

Historical Context: As indicated in Figure 1, New Zealand's price-to-income ratio was below 3.0 in the early 1990s.

3.7: Singapore

The Median Multiple in Singapore is 4.8, for a seriously unaffordable rating. This is an improvement from the severely unaffordable 5.1 Median Multiple in 2013, when Singapore was added to the *Survey*.

[36] Productivity Commission of New Zealand, "Using Land for Housing."
[37] The Productivity Commission did not propose a standard.

The Singapore Regulatory Model: Singapore is particularly challenged by its borders, having among the most land constrained geography of any major metropolitan area in the world. Singapore is an island smaller than the land area of the municipalities (not metropolitan areas) of Kansas City, Missouri or Calgary, Alberta. Singapore has no mainland periphery within its national jurisdiction and, as a result, does not have the luxury of a potentially competitive market for housing land that would keep housing affordable.[38]

These unique circumstances led the Singapore government to establish a publicly sponsored housing construction program, which sells houses to consumers (which though still called "public housing" are "privately owned"). The result is a vibrant competitive housing market. According to the Housing and Development Board (HDB), which administers the program, 82 percent of residents live in HDB housing.[39] Further, Singapore has an overall 88 percent rate of home ownership, the highest of any country in the *Survey*. Buyers are free to sell their own houses as in other nations with private ownership. Further, there are restrictions on foreign ownership, which may have shielded Singapore from the heightened cost escalation occurring from globalization of the real estate markets in an environment of significant land supply restrictions (such as urban containment policy) that has made places like Vancouver, Sydney, San Francisco and London so attractive for real estate investors (speculators).

Singapore's unique success is associated with its long-standing public commitment to keeping house prices under control

HDB has increased the rate of construction in recent years, and the additional supply has been associated with the intended result of better housing affordability. Moreover, housing affordability for new houses appears to be better (Table 9: New House Affordability in Singapore).[40]

Comparison to Other Highly Regulated Markets: Singapore has avoided the rampant house price escalation relative to incomes of other highly regulated markets, This includes markets following in the British urban containment model, which can be largely traced to the Town and Country Planning Act of 1947.

Singapore's success relative to similar markets is associated with its long-standing public commitment to keeping house prices under control. HDB has a government imposed mandate to ensure housing affordability: As HDB transitioned from a program principally aimed at rented social housing to one of home ownership, the 1964 *HDB Annual Report,* stated its intention to

> *...encourage a property-owning democracy in Singapore and to enable Singapore citizens in the lower middle income group to own their own homes*[41]

[38] Faced with a similar situation, treaties between Switzerland, France and Germany effectively create international metropolitan areas (labor markets) by the use of cross border commuting permits in the Basel and Geneva areas.
[39] Housing Development Board, *Key Statistics for FY 2016/2017,* http://www10.hdb.gov.sg/ebook/AR2017/html5/index.html?opf=tablet/2017-key-statistics.xml&launchpage=http://www10.hdb.gov.sg/ebook/AR2017/key-statistics.html.
[40] Median house price is from the Singapore Real Estate Exchange (resale houses).
[41] *Housing and Development Board 1964 Annual Report.* http://www.globalurban.org/GUDMag07Vol3Iss1/Yuen.htm.

In the intervening years, Singapore has succeeded in this objective. The contrast is great between the present situation and that of 50 years ago, when there were large squatter settlements. According to 2016 estimates by the World Bank, Singapore has the highest gross domestic product per capita in the world (purchasing power parity adjusted) among the nine nations in the *14th Annual Demographia International Housing Affordability Survey*. At $88,000,[42] Singapore ranks fourth highest in the world, behind only Qatar, China's Macao Special Economic Region and Luxembourg.

Finally, the HDB model may play an important housing market role in the new Xiongan New Area (special economic zone) at the core of the planned Jingjinji, the complex that will economically integrate Beijing, Tianjin and northern Hebei. According to the *People's Daily* publication *Global Times*, central government officials have indicated that Xiongan will "very likely follow" the Singapore model to ensure housing affordability. This could assist in managing the housing market to avoid the housing affordability problems that have plagued China's largest cities in recent years.[43]

Historical Context: Historical price-to-income multiple data has not been identified for Singapore.

Table 9
NEW HOUSE AFFORDABILITY IN SINGAPORE

The Singapore government has taken additional actions to improve housing affordability through its Housing and Development Board. One strategy has been to increase what are effectively "across the board" subsidies for all new houses (not counting special grants, such as for first home buyers). The result has been to reduce new house prices to levels well below those of existing houses.

At the same time, price-reducing grants are available to eligible resale house buyers. As in other nations, the *Survey* does not account for these grants in measuring Singapore's housing affordability. This would be virtually impossible, because of the difficulty of obtaining comparable data and the complexity of evaluating uniquely designed home ownership incentives. However, it is noted that the practice in Singapore may be substantially greater than in other nations, which would seem to have a positive influence on housing affordability.

The most recent new house offering by HDB (November 2017) indicates after after-grant prices ranging from $175,000 to $305,000 for the most popular floor plan. The midpoint of this pricing would be under 3.0 times the median household income. These flats are 90 square meters (970 square feet). This is larger than the average of 44 square feet for flats[44] in Hong Kong and 84 square meters for new houses in the United Kingdom, but smaller than new houses in Denmark (137 square meters) and the United States (219 square meters).[45] Thus, Singapore's approach to the housing market has delivered residents comparatively larger living quarters than in some other countries.

[42] International dollar, purchasing power parity.
[43] "Xiongan very likely to follow example of Singapore in land management: advisor" (October 23, 2017), *Global Times*.
[44] Peter Kamerer (September 12, 2016), "When Hong Kong flats are the size of a parking space, something is deeply wrong," *South China Morning Post*, http://www.scmp.com/comment/insight-opinion/article/2018561/when-hong-kong-flats-are-size-parking-space-something-deeplyhttp://www.scmp.com/comment/insight-opinion/article/2018561/when-hong-kong-flats-are-size-parking-space-something-deeply
[45] See Introduction.

3.8: United Kingdom

The United Kingdom has a seriously unaffordable major market Median Multiple of 4.6 and a seriously unaffordable Median Multiple of 4.5 among all markets.[46]

Major Housing Markets: None of the United Kingdom's 21 major housing markets is affordable. One major market is moderately unaffordable (Glasgow, at 3.9), and six are severely unaffordable.

There is a need to alleviate supply constraints: IMF

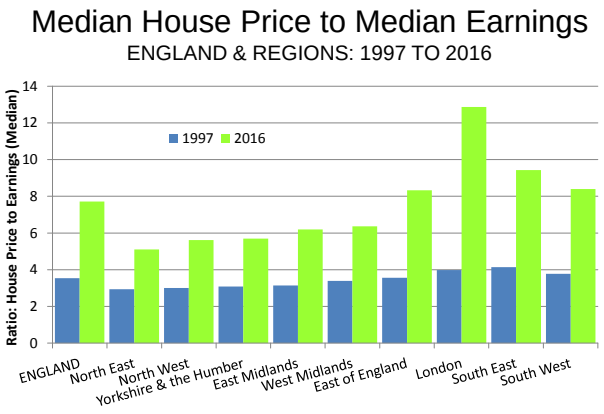
The U.K.'s largest market, London (the Greater London Authority, inside the London greenbelt) has a severely unaffordable Median Multiple of 8.5 and is rated the 10th least affordable major market in the *Survey*. In 2005, London had a Median Multiple of 6.9, indicating that house prices have increased by the equivalent of 1.6 years of pre-tax median income since that time. The UBS Global Real Estate Bubble Index rates London as having the world's fourth worst housing bubble risk.

Five other major markets are severely unaffordable, including Bournemouth & Dorset, at 7.3, the London Exurbs (East and Southeast England, virtually all outside the London greenbelt) at 6.9, Bristol-Bath at 6.8, Plymouth & Devon at 6.1, as well as Leicester and Leicestershire at 5.2.

Other Housing Markets:. Among the 33 housing markets in the United Kingdom, none are affordable. there are four markets outside the major markets are moderately unaffordable (Falkirk, at 3.7, Dundee, at 3.9 as well as Belfast and Swansea, at 4.0). Outside the major housing markets, there are four severely unaffordable housing markets, including Swindon & Wiltshire (6.0), Northampton & Northamptonshire (5.8), Warwickshire (5.7) and Telford & Shropshire (5.2).

Historical Context: The Town and Country Planning Act (1947) enacted the first important urban containment restrictions and has been a model for such restrictions around the world. Urban containment policy was substantially strengthened during the 1990s and early 2000s. All markets have urban containment policy.

In the last two decades, house prices have raced ahead of earnings (Figure 11). In England, house prices rose at 2.2 times that of earnings. In London, house prices rose at 3.2 earnings. Even in the comparatively depressed North East, house prices rose at approximately 1.75 times earnings.



Source: Data.gov.uk & Office for National Statistics

Figure 11

46 Median house prices are calculated from the Land Registry of England and Wales, the Registers of Scotland and Northern Ireland Residential Property Price Index. Household income data has been recalibrated for this edition.

Various analyses have documented the association between UK's urban containment policies and its excessively high house prices. For example, the Blair government commissioned reports by Kate Barker (2004 and 2006), and then a member of the Monetary Policy Committee of the Bank of England, which attributed much of the nation's housing affordability loss to its urban containment policies.

Sir Peter Hall, et al, expressed concerns about the housing affordability losses associated with urban containment in the early 1970s.[47] A report by the International Monetary Fund[48] indicated the need to alleviate supply-side constraints, "notably pertaining to planning restrictions…"

Britain:"originator of the ideas and mechanisms of planning which have contributed so much to the problem: Green Belts and planning by unpredictable political processes

In the Introduction to this *Demographia International Housing Affordability Survey,* Felipe Carozzi, Paul Cheshire and Christian Hilber of the London School of Economics refer to Britain as the cradle of housing unaffordability, and its role as "originator of the ideas and mechanisms of planning which have contributed so much to the problem: Green Belts and planning by unpredictable political processes!

As Figure 1 indicates, the price-to-income ratio was below 3.0 until after 2000 in the United Kingdom.

3.9: United States

Overall, the United States has a moderately unaffordable Median Multiple of 3.7,[49] tied with Ireland for the most affordable in this year's *Survey.* Among all housing markets, 49 are rated affordable and 30 are rated severely unaffordable

Major Housing Markets: The United States has a moderately unaffordable Median Multiple of 3.8 in its major markets. This is the most favorable major market housing affordability in this year's *Survey.* There are 10 affordable major housing markets in the United States and 13 severely unaffordable markets.

Ohio has three of the most affordable major markets ... an accomplishment not matched by any other national or sub-national geography.

The most affordable major housing market is Rochester, with a Median Multiple of 2.6, followed by Cincinnati and Cleveland with a Median Multiple of 2.7. Buffalo and Oklahoma City have a Median

[47] Hall, Peter Geoffrey, Ray Thomas, Harry Gracey and Roy Drewett. *The Containment of Urban England: The Planning System: Objectives Operations, Impacts*. Vol. 2 Allen and Unwin [for] PEP, 1973.
[48] International Monetary Fund, Country Report: United Kingdom: Selected Issues, http://www.imf.org/external/pubs/ft/scr/2015/cr14234.pdf, 2015.
[49] Median house prices from the National Association of Realtors and the National Home Builders Association, Zillow and metropolitan area real estate associations. Household incomes are based on the 2016 American Community Survey (U.S. Census Bureau).

Multiple of 2.8. St. Louis and Detroit have a Median Multiple of 2.9, while Grand Rapids and Indianapolis have a Median Multiple of 3.0.

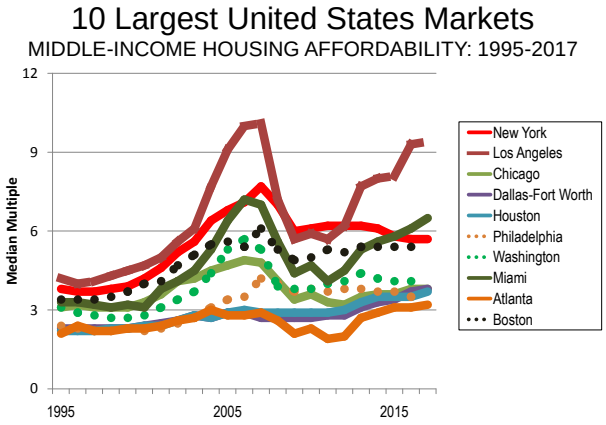
Columbus is one of the markets with a Median Multiple of 3.1, slightly worse than an affordable rating., Even so, Ohio has three of the most affordable major markets in the *Survey* (Cleveland, Cincinnati and Columbus).

The five major housing markets with the poorest U.S. housing affordability are in California and Hawaii. San Jose, in the San Francisco Bay Area, is the least affordable, with a severely unaffordable Median Multiple of 10.3, the highest reached by San Jose including during the real estate bubble of the middle 2000s. Los Angeles is the second least affordable, with a Median Multiple of 9.4. Honolulu is the third least affordable, with a Median Multiple of 9.2, while San Francisco has a Median Multiple of 9.1.

San Diego is the fifth least affordable major housing market, with a Median Multiple of 8.4. There are eight additional severely unaffordable major housing markets in the United States, including Miami (6.5), Seattle (5.9), Denver (5.7), New York (5.7) and Riverside-San Bernardino (5.7), which is adjacent to Los Angeles. Additionally Boston and Portland, Oregon are severely unaffordable, with a Median Multiple of 5.5. In Portland, there has been a substantial deterioration of housing affordability with the Median Multiple up nearly three-quarters from 3.2 in 2000. Sacramento is also severely unaffordable, at 5.3. For the second year in a row, all major markets in the Pacific region (California, Washington, Oregon and Hawaii) are severely unaffordable.

California's high house prices have made resulted in the highest poverty rate in the United States

The housing bubble that precipitated the Great Financial Crisis of the mid-2000s was centered in the United States, where housing affordability reached, at least to that time, unprecedented unaffordability. Some US major markets have now exceeded their unaffordability peak, including San Jose, Denver and Portland. The other severely unaffordable markets remain below their housing bubble peaks (Los Angeles, Honolulu, San Francisco, San Diego, Miami, Seattle, Riverside-San Bernardino, New York, Boston and Sacramento)



Source: *Harvard Joint Housing Center* and *Demographia*

Figure 12

Among the 10 largest housing markets the fastest rising house costs relative to incomes are in Los Angeles, which is reflected in smaller California housing markets (below) Miami's Median Multiple is also rising rapidly. At the same time, five of the largest markets, including Atlanta, Philadelphia, Chicago, Houston and Dallas-Fort Worth remain considerably more affordable (Figure 12)

The Housing Crisis in California: California has the most ominous housing market trends in the United States. Already, the new urban fringe housing, which drives housing affordability, is prohibited or severely limited by state and local policy. California's decades of restrictive land use regulation, including court decisions and far stronger environmental regulation than in the rest of the nation, has been associated with huge house price increases relative to incomes.[50] This is illustrated in Figure 13 which shows California's substantial housing affordability deterioration compared to the rest of the United States.

The five U.S. markets with the poorest affordability are in California and Hawaii

Since 2010, Median Multiples in the six major California markets have increased at *7.6 times* the rate of US liberally regulated major markets. As is occurring in Canada, smaller markets nearby the severely unaffordable major market in California are themselves becoming severely affordable, as has occurred major markets Riverside-San Bernardino and Sacramento and in the San Joaquin Valley markets of Fresno, Modesto and Merced.

California has the highest poverty rate in the United States, adjusted for housing costs. California also has the highest rate of homelessness in the United States.[51] Informal homeless encampments now exist, for example in the Los Angeles metropolitan area.

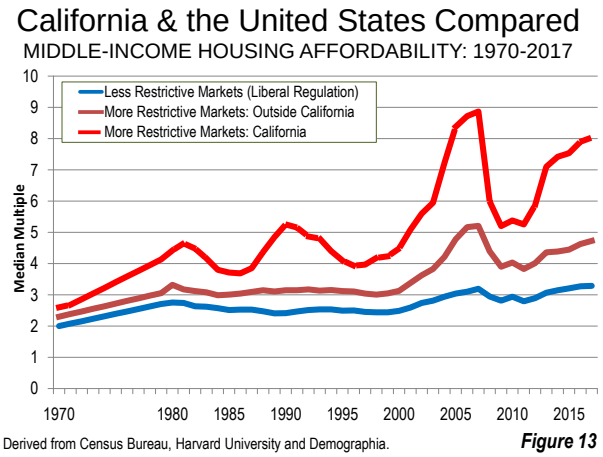


Figure 13

The state continues to be a leader in net domestic migration losses, having shed 550,000 more residents than moved in since 2010, with the rate of exodus increasing. In 2017, California's net domestic migration loss was three times than of 2011.[52] There is also a significant outflow of business investment.[53]

Prospects appear to be particularly bleak in California. Already, the new urban fringe housing, which drives housing affordability, is prohibited or severely limited by state and local policy. Short term investment ("speculation") is increasing, which is to be expected given the potential for windfall profits as the housing supply is subject to artificial and arbitrary limits that drive up excess demand.

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[50] William A. Fischel, *Regulatory Takings: Law, Economics, and Politics*. Harvard University Press, 1995.
[51] For example, John M. Quigley and Stephen Raphael (2001), "The Economics of Homelessness: The Evidence from North America," *European Journal of Housing Policy* find a relationship between poorly functioning housing markets and greater homelessness.
[52] Wendell Cox, "The Migration of Millions: 2017 State Population Estimates, http://www.newgeography.com/content/005840-california-lithium-battery-maker-heads-appalachia.
[53] See Joseph Vranich (2015), "California Companies Head for Greatness - Out of California," *newgeography.com.* Wendell Cox (2018), California Lithium Battery Manufacturer Heads to Appalachia, http://www.newgeography.com/content/005840-california-lithium-battery-maker-heads-appalachia.

While there is an increasing recognition that solving California's housing affordability requires an increase in housing supply, the commitment thus far is limited to densification efforts, and would continue to ban suburban tract housing development on the urban fringe. Some analysts claim that urban fringe development is impossible because of topographic barriers. The reality is that all of California's major metropolitan areas have sufficient adjacent land to accommodate a healthy expansion of suburban development.

However, without permitting the safety value of urban expansion to operate, it is likely that California's housing affordability will continue to deteriorate (Section 4). Indeed, there are proposals to further strengthen the urban fringe land use regulations that have played such an important part in making California so unaffordable. Already, California has the highest urban density of any US state.

Other Housing Markets: The most affordable U.S. housing market in this year's *Survey* is Youngstown, Ohio (1.9), which is also the most affordable in the *Survey,* Utica, New York has a Median Multiple of 2.1 and Peoria, Illinois a Median Multiple of 2.2. Somewhat unusually compared to previous editions, the United States has only five of the 10 most affordable markets, with four in Canada and one in Ireland.

Santa Cruz, California, located in the San Francisco Bay Area, is the least affordable market in the in the United States, with a severely unaffordable Median Multiple of 10.4, Santa Barbara, California, has a Median Multiple of 9.4.

Historical Perspective: The United States had generally affordable housing through much of the period following World War II. The key was provision of tract housing on competitively priced inexpensive land in the suburbs, the beginnings of which have been credited to entrepreneurs such as William Leavitt, who built "Levittowns" and other similar developments in New York, New Jersey, Pennsylvania, Maryland and Puerto Rico. These communities were copied and improved upon, increasing the number of households able to live a middle-income quality of life. Similar communities emerged from Canada, Australia and New Zealand to other parts of the high income world. More recently, similar trends have been followed in emerging nations, such as Mexico, the Philippines, Chile, Indonesia, Thailand, Malaysia and countries in Central America. Median Multiples in the United States were overwhelmingly below 3.0 until the 1970s and remained at that level in most housing markets until the early 2000s.

4: HOUSING AFFORDABILITY: DETERMINING THE STANDARD OF LIVING

Housing is the largest expenditure item in the household budget. Higher house prices have a disproportionate potential to reduce the standard of living by consuming funds that would otherwise be available to purchase other goods and services. Further, relative poverty can be increased, as many lower income households may have to forego basic goods and services because of higher housing costs, and may even be forced to seek public housing subsidies.

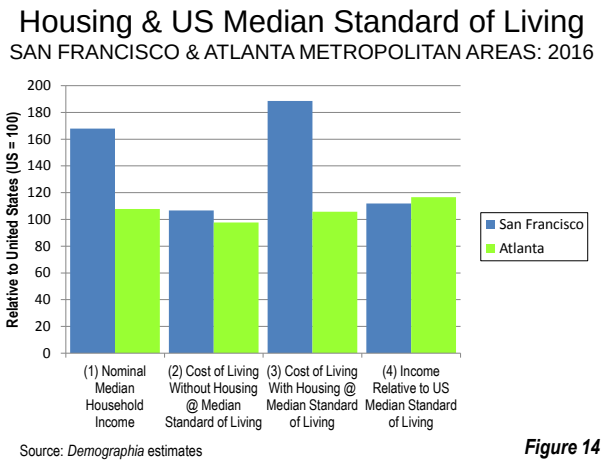
As housing costs increase relative to household incomes, severely unaffordable housing retards the standard of living. For example, in the United States, higher costs of living are strongly correlated with higher housing costs relative to incomes. Among the 107 metropolitan areas with more than 500,000 population, there is a 0.83 correlation between the overall higher cost of living and more severe housing unaffordability (higher Median Multiples).[54]

Worsening housing affordability and its adverse impact on the declining standard of living threaten one of the greatest human advances in history – the democratization of prosperity. The abject poverty that had afflicted humanity for millennia until barely 200 years ago has been replaced by unimaginable affluence and dramatic reductions in poverty. Moreover, considerable progress has been made since the World War II recovery. Economists Diedre McClosky of the University of Illinois (Chicago) and Robert Gordon of Northwestern University have published works documenting this progress.

Example: Housing Costs of Living in the San Francisco and Atlanta Metropolitan Areas: The influence of housing costs is the standard of living is illustrated by comparing the San Francisco and Atlanta metropolitan areas (Figure 14).

In San Francisco, the nominal (not adjusted for the cost of living) median household income is approximately 55 percent greater than in Atlanta (Figure 14, column 1).

The cost of living for goods and services aside from housing for the median standard of living, is similar between the two metropolitan areas. San Francisco's cost of living for goods and services other than housing is approximately percent higher than in Atlanta (Figure 14, column 2).



Source: *Demographia* estimates

Figure 14

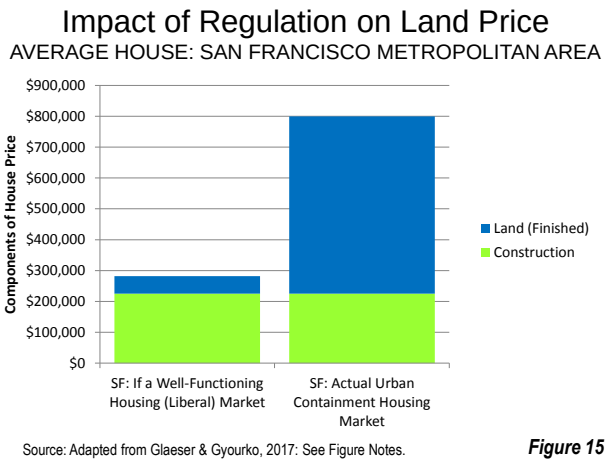
However, when housing is included, the cost of living for the median standard of living rises to above 75 percent higher in San Francisco than in Atlanta (Figure 14, column 3).

[54] Correlation is measured on a scale of from 1.00 (perfect correlation or perfect relationship) to minus 1.00 (no correlation or no relationship). This analysis compares 2016 costs of living for households moving to metropolitan areas and the corresponding Median Multiples, weighted by the national home ownership versus rental share. The calculation assumes the home buyer purchases the median priced house at typical purchase conditions. See Center for Opportunity Urbanism (2017), *COU Standard of Living Index*.

San Francisco's high cost of living cancels out its higher nominal income advantage over Atlanta. The Atlanta household is able to afford a US median standard of living[55] and has 17 percent left over. The San Francisco household would have only 12 percent left over (Figure 14, column 4).[56] Thus, Atlanta metropolitan area residents can afford a somewhat higher standard of living than San Francisco metropolitan area residents. The Atlanta advantage would likely be greater if the effect of the progressive federal income tax were included.[57]

The extraordinarily high house prices have significantly reduced discretionary income in the costly markets that could otherwise be used for other goods and services. Not only would this additional consumption (or savings) increase the standard of living, but it would also lead to higher levels of employment and economic growth. Further, the higher housing prices feed the demand for more low-income affordable housing, which requires public subsidies. The higher prices make the housing market unaffordable for more households.

Well Functioning Housing Markets: The key to both housing affordability and an affordable standard of living is a competitive market that produces housing (including the cost of associated land) at production costs, including competitive profit margins. Economists Edward Glaeser of Harvard University and Joseph Gyourko of the University of Pennsylvania,[58] refer to this as the minimum profitable production cost (MPPC). For single detached houses in the United States, their research indicates that land (with associated infrastructure) costs 20% or less of the MPPC final house and land sale price.[59] Glaeser and Gyourko consider a housing market to be functioning well if houses are produced at no more than 25 percent above the MPPC.



Source: Adapted from Glaeser & Gyourko, 2017: See Figure Notes.

Figure 15

The *Demographia* major housing markets included in the Glaeser and Gyourko research had a 2.9 Median Multiple (rated affordable) over the nearly 30 years covered in the research. Housing has, however, become more expensive in the well functioning markets, having risen from a 2.7 Median Multiple in 1985 (Table 10).[60]

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[55] The median standard of living is defined as the cost of living for a household recently moving to the area. It is assumed that the household will either purchase a median prices house, on typical terms, or pay median rent for a housing unit. The data is weighted at the US tenure rates for home ownership and renting.
[56] See: *COU Standard of Living Index*.
[57] Higher rates at higher nominal incomes. Comparable income tax information is not readily available.
[58] Glaeser, Edward L and Joseph Gyourko (2017), "The Economic Implications of Housing Supply, Samuel Zell and Robert Lurie Real Estate Center, University of Pennsylvania. http://realestate.wharton.upenn.edu/research/papers.php?paper=802
[59] Finished land costs have generally been similar in Australia, Canada, New Zealand and the United Kingdom where there is liberal regulation. Land prices usually rise strongly after implementation of urban containment.
[60] Demographia analysis.

Glaeser and Gyourko find that there has been little change in construction costs over the period. However, land costs have risen substantially. For example, Glaeser and Gyourko find that virtually all of the costs above minimum production costs in the San Francisco metropolitan area are in land, which they estimate is *10 times* the cost that would be expected in a well functioning housing market (Figure 15). Rather than representing 20 percent of the final cost, land represents more than 70 percent of the cost in their estimate.[61] The San Francisco market, with its strong urban containment policies had been well-functioning before the imposition of restrictive land use regulation, when Median Multiples were under 3.0.

Table 10
AFFORDABLE HOUSING MARKETS: DEFINITION

For metropolitan areas to rate as 'affordable' and ensure that housing bubbles are not triggered, housing prices should not exceed three times gross annual household earnings. To allow this to occur, new starter housing of an acceptable quality to the purchasers, with associated commercial and industrial development, must be allowed to be provided on the urban fringes at 2.5 times the gross annual median household income of that urban market.

The critically important "development ratios"[62] for this new fringe starter housing should be 17 - 23% serviced lot / section cost - the balance the actual housing construction.

Ideally through a normal building cycle, the Median Multiple should move from a Floor Multiple of 2.3, through a Swing Multiple of 2.5 to a Ceiling Multiple of 2.7 - to ensure maximum stability and optimal medium and long term performance of the residential construction sector.

-Hugh Pavletich
Performance Urban Planning

Urban Containment Policy: In contrast with well functioning housing markets, virtually all the severely unaffordable major housing markets covered in the *Demographia International Housing Affordability Survey* have restrictive land use regulation, overwhelmingly urban containment. A typical strategy for limiting or prohibiting new housing on the urban fringe an "urban growth boundary," (UGB) which leads to (and is intended to lead to) an abrupt gap in land values (Figure 16).[63]

Contrary to expectations that higher densities would lower land costs and preserve housing affordability, house prices have skyrocketed inside the UGBs. The San Francisco example above indicates this result. This also leads to extraordinary price increases that attract investment (speculation), a factor that has little or no impact on middle-income housing affordability where there is liberal regulation (as opposed to urban containment).

[61] Profit margins are proportionately allocated to construction and land for this analysis.
[62] The development ratio is the cost of the finished land (underlying infrastructure complete) divided by the house construction cost plus the finished land. This issue is extensively discussed with respect to the United States market in the *Demographia Residential Land & Regulation Cost Index*.
[63] See: *Restrictive Land-Use Regulation: Strategies, Effects and Solutions* for a literature review and list of references.

In fact, the higher land prices and the resultant higher house prices are consistent with the basics of economics. Virtually across the road land value gaps of ten or more times result.[64] This destroys the competitive market for land by removing the "supply vent"[65] necessary to maintain housing affordability

In the Introduction (above) economists Felipe Carozzi, Paul Cheshire and Christian Hilber of the London School of Economics refer to the "ideas and mechanisms of planning which have contributed so much to the problem" They specifically cite Green Belts, a form of urban growth boundary that has been associated with particularly large housing affordability deterioration in the United Kingdom (Section 3.8), Toronto (Section 3.2) and elsewhere.

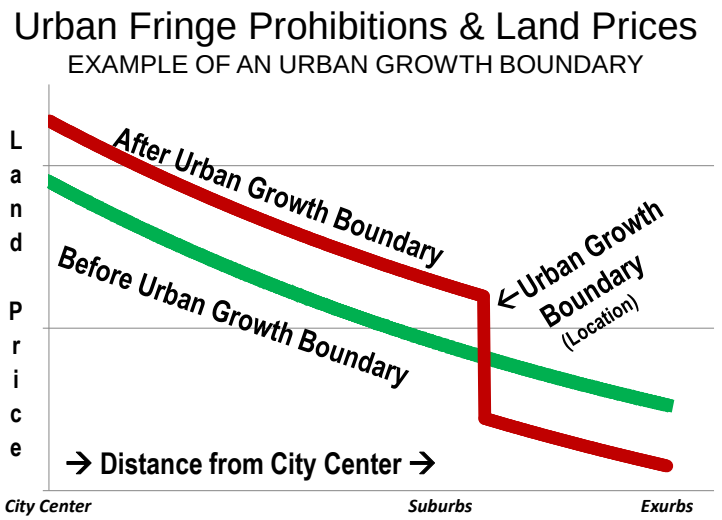

Figure 16

Urban containment makes it virtually impossible to build the low cost suburban tract housing that made housing more inexpensive and led to higher rates of home ownership in the decades following World War II and the democratization of prosperity.

The "Problem:" Urban Expansion: A principal purpose of urban containment policy is to stop the spatial expansion (pejoratively called "urban sprawl") of urban areas. This justified by various rationales, such as the cost of infrastructure for new development, preservation of agricultural land and providing mass transit service throughout the urban form.[66]

The infrastructure financing concern can erroneously result from planning preferences rather than reality, according to urban economist Claude Gruen.[67] Moreover, analyses typically fail to consider the extraordinarily house price increases that arise from severe limits on greenfield housing land, which can dwarf any anticipated higher infrastructure costs.

Similarly, the need to preserve agricultural land has been exaggerated. Shlomo Angel, one of the world's leading urban experts, concluded that "added reserves of cultivatable land are available to

[64] See: Wendell Cox. "A Question of Values: Middle-Income Housing Affordability and Urban Containment Policy." *Frontier Centre for Public Policy,* October 2015. https://www.fcpp.org/a_question_of_values.
[65] See Table 3.
[66] Andrea Hopkins (October 16, 2016), "Short supply, bad infrastructure blamed for Canada housing bubble," Reuters, https://www.reuters.com/article/us-canada-economy-housing/short-supply-bad-infrastructure-blamed-for-canada-housing-bubble-idUSKCN1252LA.
[67] See: Claude Gruen (2010), *New Urban Development: Looking Back to See Forward,* Rutgers University Press.

feed the planet in perpetuity..." in an analysis of future urban and agricultural needs, in his classic *Planet of Cities.*[68]

The mass transit rationale for urban containment is based on an archaic, pre-automobile, early 20th century perception of the city as mono-centric, organized around a central business district (CBD) assumed to contain most of the employment. To the contrary, in most major metropolitan areas, less than 20 percent of employment is in the CBDs.[69] In places as diverse as different as Tokyo, London, New York, Melbourne, Phoenix and elsewhere, the majority of jobs are dispersed throughout the modern urban area, mainly outside the CBDs. Mass transit typically provides auto-competitive mobility to the CBD, but not to the rest of the metropolitan area. The many more work destinations outside the CBDs generally take much longer to reach, if they can be reached at all by mass transit.

For example, less than five percent of workers living in the outer counties of the London region or the New York metropolitan area commute to the CBD. In Sydney less than 10 percent workers outer suburbs such as Campbelltown and Penrith work in the inner city (a much larger area than the CBD).[70] Among the 49 largest metropolitan areas in the United States, the average worker can reach more than 40 times as many jobs in 30 minutes by car as by mass transit.[71] Even in New York, with one of the world's most extensive mass transit systems, cars provide 13 times the employment access of mass transit.

The far higher house prices, higher cost of living and greater poverty associated with urban containment are exorbitant prices to pay for addressing problems that have been exaggerated and for limiting organic urban expansion to serve such a small number of commuters.

Urban Containment: A Solution Worse than the Problem: Within a quarter century of urban containment's original United Kingdom implementation, renown urban planner Sir Peter Hall (who served at the London School of Economics) and colleagues concluded that "perhaps the biggest single failure" of urban containment has been its failure to prevent losses in housing affordability.[72] The evidence that has developed in the nearly 50 years only confirms and amplifies that concern.

Ineffective Initiatives: Various governments with urban containment policy have sought to bring control to their upward spiraling house prices. Foreign buyers' taxes have been imposed in Vancouver and Toronto, strengthened mortgage eligibility requirements have been adopted in various places, and affordable housing programs for low income citizens have been proposed. Such

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[68] Shlomo Angel (2012), *Planet of Cities*, Lincoln Land Institute. Angel also provided the introductions to the 5th and 11th *Annual Demographia International Housing Affordability Surveys.*

[69] See Demographia, "International Central Business District Market Share Trends," http://www.demographia.com/db-intlcbd-trends.htm.

[70] Data from 2016 Australian Census provided by Urban Economics, Brisbane. Sydney inner city data refers to the 2016 Sydney Statistical Level 3 (SA3).

[71] The average one way commute time in the United States was 26 minutes in 2015 (American Community Survey).

[72] Hall, Peter Geoffrey, Ray Thomas, Harry Gracey and Roy Drewett (1973). *The Containment of Urban England: The Planning System: Objectives Operations, Impacts*. Vol. 2 Allen and Unwin [for] PEP, 1973

"affordable housing" programs have sometimes been mistaken by the media and others as addressing the middle-income housing affordability crisis.

Unless urban fringe restrictions are relaxed enough to restore the competitive market for land, housing affordability is likely to worsen even more

However, demand continues to exceed supply. If supply is not materially liberalized, worsened housing affordability is likely. Former Governor of the Reserve Bank New Zealand Donald Brash indicated: "...the affordability of housing is overwhelmingly a function of just one thing, the extent to which governments place artificial restrictions on the supply of residential land."[73]

There is an emerging consensus that more housing supply is required to restore housing affordability. However, in urban containment metropolitan areas, interest in new supply has been largely limited to higher density infill, while leaving the urban periphery restrictions in place (Section 3.9). This seriously diminishes the potential for improving housing affordability, because the lowest land prices are on the urban periphery and because there is substantial demand for the larger housing, preferred by families, that can only be economically built there. Unless urban fringe restrictions are relaxed enough to restore the competitive market for land, housing affordability is likely to worsen even more (Figure 15, above).

On the contrary, even with torrid high-density building rates in urban cores, such as Vancouver, Toronto and Sydney, housing affordability has *worsened*. Even in Inner London prices have continued to increase, despite the greatest urban core densification in the high-income world.[74]

Signs of Progress: There are some signs of progress. The greater emphasis on the need for additional supply is an important step in the right direction, even if the proposed strategies fail to deal with the root of the problem. Elsewhere, however, governments have and are embracing approaches more complete approaches.

Most recently, New Zealand's just elected (2017) Sixth Labour government of New Zealand has committed itself to an urban agenda that includes both supply and demand strategies and innovative proposals for bond financing of infrastructure in developing areas. This could develop into an important model for others to follow (Section 3.6).

Over a longer term (50 years), Singapore has pursued proactive policies designed to preserve housing affordability, which have performed remarkably well, in view of its geographical restrictions and strong population growth. This model may be emulated in China's Xiongan new area (Section 3.7).

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[73] From the Introduction to the *4th Annual Demographia International Housing Affordability Survey*, http://www.demographia.com/dhi2008.pdf.

[74] Since 1991, Inner London has added more than 900,000 residents, an increase of more than one-third. This is *addition* in population density is greater than the existing population density of the Sydney urban area (urban center). Data from the Office for National Statistics (UK) and the Australian Bureau of Statistics.

Putting People First: Urban planning, like other fields of public administration, is justified by its contribution to the public good. Michael Silver, a former president of the American Planning Association suggested that the purpose of planning is the orderly growth and development of communities, and the faithful protection of the public interest. [75] He went on to say: "Planners are guardians of a common future and plan for the needs of present and future generations. Planning is intended to focus on "place" *and* "people" (emphasis in original).

In her legendary book, *The Life and Death of Great American Cities,* Jane Jacobs said "...a metropolitan economy, if it is working well, is constantly transforming many poor people into middle-class people..."[76] In her last interview, she said that "If planning helps people, they ought to be better off as a result, not worse off."[77] The tragedy is that strong land use regulation, especially urban containment, has been associated with making people worse off economically, the starkest example of which may be affluent and over-regulated California,[78] now with the highest poverty rate in the United States, due to its high housing costs (Section 3.9).

Indeed, a growing body of research associates strong land use regulation with diminished economic growth.[79] Matthew Rognlie (now of Northwestern University) found that virtually all of the rising recent inequality in wealth was related to housing and suggested re-examination of the housing regulation. [80]

Paul C. Cheshire, Max Nathan and Henry G. Overman of the London School of Economics summarize the fundamental point succinctly: "… improving places is a means to an end, rather than an end in itself."[81]

[75] http://www.smartcitymemphis.com/2013/07/city-planning-anyone/
[76] Jacobs, Jane (1961), *The Death and Life of Great American Cities,* Vintage 1992
[77] https://www.citylab.com/equity/2016/05/jane-jacobs-quotes-last-interview-100th-birthday/481053/
[78] See for example, Legislative Analyst's Office (state of California), 2015, http://www.lao.ca.gov/reports/2015/finance/housing-costs/housing-costs.pdf.
[79] See for example, Hsieh, Chang-Tai and Enrico Moretti (2015). "Why Do Cities Matter? Local Growth and Aggregate Growth." The National Bureau of Economic Research. http://www.nber.org/papers/w21154.
[80] Matthew Rognlie, "A note on Piketty and diminishing returns to capital," http://gabriel-zucman.eu/files/teaching/Rognlie14.pdf
[81] Cheshire, Nathan and Overman, *Urban Economics and Urban Policy.*

SCHEDULE 1
MAJOR HOUSING MARKETS RANKED BY AFFORDABILITY: Most Affordable to Least Affordable
Median Multiple (Median House Price/Median Household Income): 2017: Third Quarter
14th Annual Demographia International Housing Affordability Survey

Rank	Nation	Metropolitan Market	Median Multiple
1	U.S.	Rochester, NY	2.6
2	U.S.	Cincinnati, OH-KY-IN	2.7
2	U.S.	Cleveland, OH	2.7
4	U.S.	Buffalo, NY	2.8
4	U.S.	Oklahoma City, OK	2.8
4	U.S.	Pittsburgh, PA	2.8
7	U.S.	Detroit, MI	2.9
7	U.S.	Saint Louis, MO-IL	2.9
9	U.S.	Grand Rapids, MI	3.0
9	U.S.	Indianapolis, IN	3.0
11	U.S.	Columbus, OH	3.1
11	U.S.	Kansas City, MO-KS	3.1
11	U.S.	Louisville, KY-IN	3.1
14	U.S.	Atlanta, GA	3.2
14	U.S.	Hartford, CT	3.2
16	U.S.	Baltimore, MD	3.4
16	U.S.	Memphis, TN-MS-AR	3.4
16	U.S.	Minneapolis-St. Paul, MN-WI	3.4
19	Japan	Osaka-Kobe-Kyoto*	3.5
19	U.S.	Philadelphia, PA-NJ-DE-MD	3.5
19	U.S.	Virginia Beach-Norfolk, VA-NC	3.5
22	U.S.	Raleigh, NC	3.6
23	Canada	Edmonton, AB	3.7
23	U.S.	Birmingham, AL	3.7
23	U.S.	Houston, TX	3.7
26	U.S.	Charlotte, NC-SC	3.8
26	U.S.	Chicago, IL	3.8
26	U.S.	Dallas-Fort Worth, TX	3.8
26	U.S.	Nashville, TN	3.8
26	U.S.	San Antonio, TX	3.8
31	Canada	Ottawa-Gatineau, ON-QC	3.9
31	U.K.	Glasgow	3.9
33	U.S.	Jacksonville, FL	4.0
33	U.S.	Richmond, VA	4.0
35	Canada	Calgary, AB	4.1
35	U.K.	Blackpool & Lancashire	4.1
35	U.K.	Sheffield & South Yorkshire	4.1
35	U.S.	Austin, TX	4.1
35	U.S.	New Orleans, LA	4.1
40	U.S.	Milwaukee, WI	4.2
40	U.S.	Phoenix, AZ	4.2
40	U.S.	Salt Lake City, UT	4.2
40	U.S.	Washington, DC-VA-MD-WV	4.2
44	U.K.	Derby & Derbyshire	4.3
44	U.K.	Leeds & West Yorkshire	4.3
44	U.K.	Liverpool & Merseyside	4.3
44	U.S.	Tampa-St. Petersburg, FL	4.3
44	U.S.	Tucson, AZ	4.3
49	U.K.	Middlesbrough & Durham	4.4
49	U.K.	Newcastle & Tyneside	4.4
51	Canada	Montréal, QC	4.5
51	U.K.	Edinburgh	4.5
51	U.K.	Stoke on Trent & Staffordshire	4.5
51	U.S.	Providence, RI-MA	4.5
55	U.K.	Manchester & Greater Manchester	4.6
55	U.K.	Nottingham & Nottinghamshire	4.6
55	U.S.	Orlando, FL	4.6
58	U.S.	Las Vegas, NV	4.7
59	Ireland	Dublin	4.8
59	Japan	Tokyo-Yokohama*	4.8
59	Singapore	Singapore	4.8
59	U.K.	Hull & Humber	4.8
59	U.K.	Warrington & Cheshire	4.8
64	U.K.	Birmingham & West Midlands	5.0
65	U.K.	Leicester & Leicestershire	5.2
66	U.S.	Sacramento, CA	5.3
67	U.S.	Boston, MA-NH	5.5
67	U.S.	Portland, OR-WA	5.5
69	U.S.	Denver, CO	5.7
69	U.S.	New York, NY-NJ-PA	5.7
69	U.S.	Riverside-San Bernardino, CA	5.7
72	Australia	Perth, WA	5.9
72	U.S.	Seattle, WA	5.9
74	U.K.	Plymouth & Devon	6.1
75	Australia	Brisbane, QLD	6.3
76	U.S.	Miami, FL	6.5
77	Australia	Adelaide, SA	6.6
78	U.K.	Bristol-Bath	6.8
79	U.K.	London Exurbs (E & SE England)	6.9
80	U.K.	Bournemouth & Dorsett	7.3
81	Canada	Toronto, ON	7.9
82	U.S.	San Diego, CA	8.4
83	U.K.	London (Greater London Authority)	8.5
84	N.Z.	Auckland	8.8
85	U.S.	San Francisco, CA	9.1
86	U.S.	Honolulu, HI	9.2
87	U.S.	Los Angeles, CA	9.4
88	Australia	Melbourne, VIC	9.9
89	U.S.	San Jose, CA	10.3
90	Canada	Vancouver, BC	12.6
91	Australia	Sydney, NSW	12.9
92	China	Hong Kong	19.4

SCHEDULE 2
ALL HOUSING MARKETS RANKED BY AFFORDABILITY: Most Affordable to Least Affordable
Median Multiple (Median House Price/Median Household Income): 2017: Third Quarter
14th Annual Demographia International Housing Affordability Survey

Rank	Nation	Metropolitan Market	Median Multiple
1	U.S.	Youngstown, OH-PA	1.9
2	Canada	Moncton, NB	2.1
2	U.S.	Utica, NY	2.1
4	Canada	Fort McMurray, AB	2.2
4	Canada	Fredericton, NB	2.2
4	Ireland	Limerick	2.2
4	U.S.	Peoria, IL	2.2
8	Canada	Saint John, NB	2.3
8	U.S.	Scranton-Wilkes Barre, PA	2.3
10	U.S.	Cedar Rapids, IA	2.4
10	U.S.	Davenport, IA-IL	2.4
10	U.S.	Rockford, IL	2.4
10	U.S.	Syracuse, NY	2.4
14	U.S.	Erie, PA	2.5
14	U.S.	Wichita, KS	2.5
16	Canada	Charlottetown, PEI	2.6
16	Canada	Chatham, ON	2.6
16	U.S.	Canton, OH	2.6
16	U.S.	Ft. Wayne, IN	2.6
16	U.S.	Lansing, MI	2.6
16	U.S.	Rochester, NY	2.6
16	U.S.	South Bend, IN	2.6
16	U.S.	Toledo, OH	2.6
24	Canada	Cape Breton, NS	2.7
24	Canada	Saguenay, QC	2.7
24	Canada	Trois-Rivières, QC	2.7
24	Ireland	Waterford	2.7
24	U.S.	Akron, OH	2.7
24	U.S.	Cincinnati, OH-KY-IN	2.7
24	U.S.	Cleveland, OH	2.7
24	U.S.	Dayton, OH	2.7
24	U.S.	Little Rock, AR	2.7
33	U.S.	Buffalo, NY	2.8
33	U.S.	Harrisburg, PA	2.8
33	U.S.	Kalamazoo, MI	2.8
33	U.S.	New London, CT	2.8
33	U.S.	Oklahoma City, OK	2.8
33	U.S.	Omaha, NE-IA	2.8
33	U.S.	Pittsburgh, PA	2.8
33	U.S.	York, PA	2.8
41	U.S.	Amarillo, TX	2.9
41	U.S.	Des Moines, IA	2.9
41	U.S.	Detroit, MI	2.9
41	U.S.	Duluth, MN	2.9
41	U.S.	Fayetteville, NC	2.9
41	U.S.	Green Bay, WI	2.9
41	U.S.	Gulfport, MS	2.9
41	U.S.	Mobile, AL	2.9
41	U.S.	Reading, PA	2.9
41	U.S.	Saint Louis, MO-IL	2.9
41	U.S.	Springfield, MO	2.9
52	Canada	Sarnia, ON	3.0
52	Canada	Windsor, ON	3.0
52	U.S.	Flint, MI	3.0
52	U.S.	Grand Rapids, MI	3.0
52	U.S.	Hagerstown, MD-WV	3.0
52	U.S.	Indianapolis, IN	3.0
52	U.S.	Lancaster, PA	3.0
52	U.S.	Lexington, KY	3.0
52	U.S.	Lincoln, NE	3.0
52	U.S.	Montgomery, AL	3.0
52	U.S.	Sioux Falls, SD	3.0
63	Canada	Thunder Bay, ON	3.1
63	U.S.	Allentown, PA	3.1
63	U.S.	Beaumont, TX	3.1
63	U.S.	Columbia, SC	3.1
63	U.S.	Columbus, OH	3.1
63	U.S.	Kansas City, MO-KS	3.1
63	U.S.	Killeen , TX	3.1
63	U.S.	Louisville, KY-IN	3.1
63	U.S.	Tulsa, OK	3.1
72	Australia	Gladstone, QLD	3.2
72	Canada	Regina, SK	3.2
72	Canada	St. John's, NL	3.2
72	U.S.	Albany, NY	3.2
72	U.S.	Atlanta, GA	3.2
72	U.S.	Brownsville, TX	3.2
72	U.S.	Hartford, CT	3.2
72	U.S.	Huntsville, AL	3.2
80	Canada	Lethbridge, AB	3.3
80	Canada	Red Deer, AB	3.3
80	U.S.	Atlantic City, NJ	3.3
80	U.S.	Spartanburg, SC	3.3
80	U.S.	Winston-Salem, NC	3.3
85	Canada	Halifax, NS	3.4
85	Canada	Québec, QC	3.4
85	U.S.	Baltimore, MD	3.4
85	U.S.	Corpus Christi, TX	3.4
85	U.S.	Memphis, TN-MS-AR	3.4
85	U.S.	Minneapolis-St. Paul, MN-WI	3.4
85	U.S.	New Haven, CT	3.4
92	Canada	Sherbrooke, QC	3.5

SCHEDULE 2
ALL HOUSING MARKETS RANKED BY AFFORDABILITY: Most Affordable to Least Affordable
Median Multiple (Median House Price/Median Household Income): 2017: Third Quarter
14th Annual Demographia International Housing Affordability Survey

Rank	Nation	Metropolitan Market	Median Multiple	Rank	Nation	Metropolitan Market	Median Multiple
92	Japan	Osaka-Kobe-Kyoto*	3.5	130	U.S.	Springfield, MA	3.9
92	U.S.	Anchorage, AK	3.5	140	Ireland	Galway	4.0
92	U.S.	El Paso, TX	3.5	140	U.K.	Belfast	4.0
92	U.S.	Fayetteville, AR-MO	3.5	140	U.K.	Swansea	4.0
92	U.S.	Greensboro, NC	3.5	140	U.S.	Ann Arbor, MI	4.0
92	U.S.	Jackson, MS	3.5	140	U.S.	Jacksonville, FL	4.0
92	U.S.	Knoxville, TN	3.5	140	U.S.	Richmond, VA	4.0
92	U.S.	McAllen, TX	3.5	140	U.S.	Tallahassee, FL	4.0
92	U.S.	Ogden, UT	3.5	147	Australia	Mackay, QLD	4.1
92	U.S.	Philadelphia, PA-NJ-DE-MD	3.5	147	Canada	Calgary, AB	4.1
92	U.S.	Roanoke, VA	3.5	147	Canada	London, ON	4.1
92	U.S.	Salisbury, MD	3.5	147	U.K.	Aberdeen	4.1
92	U.S.	Virginia Beach-Norfolk, VA-NC	3.5	147	U.K.	Blackpool & Lancashire	4.1
106	Canada	Kingston, ON	3.6	147	U.K.	Sheffield & South Yorkshire	4.1
106	Canada	Winnipeg, MB	3.6	147	U.S.	Austin, TX	4.1
106	U.S.	Manchester, NH	3.6	147	U.S.	Boise, ID	4.1
106	U.S.	Raleigh, NC	3.6	147	U.S.	Daytona Beach, FL	4.1
106	U.S.	Trenton, NJ	3.6	147	U.S.	New Orleans, LA	4.1
111	Canada	Edmonton, AB	3.7	147	U.S.	Shreveport, LA	4.1
111	Ireland	Cork	3.7	158	Australia	Townsville, QLD	4.2
111	U.K.	Falkirk	3.7	158	U.S.	Milwaukee, WI	4.2
111	U.S.	Birmingham, AL	3.7	158	U.S.	Olympia, WA	4.2
111	U.S.	Chattanooga, TN-GA	3.7	158	U.S.	Palm Bay, FL	4.2
111	U.S.	Houston, TX	3.7	158	U.S.	Phoenix, AZ	4.2
111	U.S.	Ocala, FL	3.7	158	U.S.	Provo, UT	4.2
111	U.S.	Pensacola, FL	3.7	158	U.S.	Salt Lake City, UT	4.2
111	U.S.	Waco, TX	3.7	158	U.S.	Spokane, WA	4.2
120	Canada	Saskatoon, SK	3.8	158	U.S.	Washington, DC-VA-MD-WV	4.2
120	U.S.	Baton Rouge, LA	3.8	167	Australia	Darwin, NT	4.3
120	U.S.	Charlotte, NC-SC	3.8	167	U.K.	Derby & Derbyshire	4.3
120	U.S.	Chicago, IL	3.8	167	U.K.	Leeds & West Yorkshire	4.3
120	U.S.	Dallas-Fort Worth, TX	3.8	167	U.K.	Liverpool & Merseyside	4.3
120	U.S.	Greenville, SC	3.8	167	U.S.	Bremerton, WA	4.3
120	U.S.	Lakeland, FL	3.8	167	U.S.	Myrtle Beach, SC	4.3
120	U.S.	Nashville, TN	3.8	167	U.S.	Portland, ME	4.3
120	U.S.	San Antonio, TX	3.8	167	U.S.	Tampa-St. Petersburg, FL	4.3
120	U.S.	Worcester, MA	3.8	167	U.S.	Tucson, AZ	4.3
130	Australia	Rockhampton, QLD	3.9	176	Canada	Kamloops. BC	4.4
130	Canada	Belleville, ON	3.9	176	U.K.	Middlesbrough & Durham	4.4
130	Canada	Ottawa-Gatineau, ON-QC	3.9	176	U.K.	Newcastle & Tyneside	4.4
130	Canada	Whitehorse, YT	3.9	176	U.S.	Cape Coral, FL	4.4
130	U.K.	Dundee	3.9	176	U.S.	Colorado Springs, CO	4.4
130	U.K.	Glasgow	3.9	181	Canada	Montréal, QC	4.5
130	U.S.	Albuquerque, NM	3.9	181	N.Z.	Palmerston North-Manawatu	4.5
130	U.S.	Kennewick, WA	3.9	181	U.K.	Cardiff	4.5
130	U.S.	Madison, WI	3.9	181	U.K.	Edinburgh	4.5

SCHEDULE 2
ALL HOUSING MARKETS RANKED BY AFFORDABILITY: Most Affordable to Least Affordable
Median Multiple (Median House Price/Median Household Income): 2017: Third Quarter
14th Annual Demographia International Housing Affordability Survey

Rank	Nation	Metropolitan Market	Median Multiple
181	U.K.	Perth	4.5
181	U.K.	Stoke on Trent & Staffordshire	4.5
181	U.S.	Bridgeport, CT	4.5
181	U.S.	Charleston, SC	4.5
181	U.S.	Fort Walton Beach, FL	4.5
181	U.S.	Providence, RI-MA	4.5
191	Australia	Alice Springs, NT	4.6
191	Canada	Peterborough, ON	4.6
191	U.K.	Manchester & Greater Manchester	4.6
191	U.K.	Newport	4.6
191	U.K.	Nottingham & Nottinghamshire	4.6
191	U.S.	Bakersfield, CA	4.6
191	U.S.	Durham, NC	4.6
191	U.S.	Gainesville, FL	4.6
191	U.S.	Orlando, FL	4.6
191	U.S.	Port St. Lucie, FL	4.6
201	U.S.	Las Vegas, NV	4.7
202	Ireland	Dublin	4.8
202	Japan	Tokyo-Yokohama*	4.8
202	Singapore	Singapore	4.8
202	U.K.	Hull & Humber	4.8
202	U.K.	Warrington & Cheshire	4.8
202	U.S.	Asheville, NC	4.8
202	U.S.	Laredo, TX	4.8
202	U.S.	Salem, OR	4.8
202	U.S.	Visalia, CA	4.8
202	U.S.	Wilmington, NC	4.8
212	Canada	Brantford, ON	4.9
212	U.S.	Greeley, CO	4.9
214	Australia	Toowoomba, QLD	5.0
214	U.K.	Birmingham & West Midlands	5.0
214	U.S.	Sarasota, FL	5.0
217	U.S.	Fort Collins, CO	5.1
218	Canada	St. Catharines-Niagara, ON	5.2
218	U.K.	Leicester & Leicestershire	5.2
218	U.K.	Telford & Shropshire	5.2
218	U.S.	College Station, TX	5.2
218	U.S.	Fresno, CA	5.2
218	U.S.	Merced, CA	5.2
224	U.S.	Modesto, CA	5.3
224	U.S.	Sacramento, CA	5.3
226	Australia	Ballarat, VIC	5.4
226	Australia	Bendigo, VIC	5.4
226	Australia	Bundaberg, QLD	5.4
226	N.Z.	Christchurch	5.4
226	N.Z.	Dunedin	5.4
231	Canada	Cambridge, ON	5.5
231	Canada	Kitchener-Waterloo, ON	5.5
231	N.Z.	Wellington	5.5
231	U.S.	Boston, MA-NH	5.5
231	U.S.	Eugene, OR	5.5
231	U.S.	Portland, OR-WA	5.5
231	U.S.	Vallejo, CA	5.5
238	Canada	Oshawa, ON	5.7
238	U.K.	Warwickshire	5.7
238	U.S.	Denver, CO	5.7
238	U.S.	New York, NY-NJ-PA	5.7
238	U.S.	Riverside-San Bernardino, CA	5.7
243	Australia	Canberra, ACT	5.8
243	U.K.	Northampton & Northamptonshire	5.8
243	U.S.	Stockton, CA	5.8
246	Australia	Cairns, QLD	5.9
246	Australia	Perth, WA	5.9
246	Canada	Barrie, ON	5.9
246	U.S.	Seattle, WA	5.9
250	Canada	Guelph, ON	6.0
250	U.K.	Swindon & Wiltshire	6.0
250	U.S.	Reno, NV	6.0
253	N.Z.	Napier-Hastings	6.1
253	U.K.	Plymouth & Devon	6.1
255	Australia	Hobart, TAS	6.2
256	Australia	Brisbane, QLD	6.3
257	Australia	Fraser Coast, QLD	6.5
257	N.Z.	Hamilton-Waikato	6.5
257	U.S.	Miami, FL	6.5
260	Australia	Adelaide, SA	6.6
260	Canada	Hamilton, ON	6.6
260	Canada	Kelowna, BC	6.6
263	Canada	Chilliwack	6.8
263	U.K.	Bristol-Bath	6.8
265	U.K.	London Exurbs (E & SE England)	6.9
265	U.S.	Naples, FL	6.9
267	Australia	Geelong, VIC	7.1
268	Canada	Nanaimo, BC	7.2
269	U.K.	Bournemouth & Dorsett	7.3
270	U.S.	Boulder, CO	7.4
271	Canada	Fraser Valley	7.7
271	U.S.	Oxnard, CA	7.7
273	Canada	Toronto, ON	7.9
274	Canada	Victoria, BC	8.1
275	U.S.	San Luis Obispo, CA	8.3
275	U.S.	Santa Rosa, CA	8.3

SCHEDULE 2
ALL HOUSING MARKETS RANKED BY AFFORDABILITY: Most Affordable to Least Affordable
Median Multiple (Median House Price/Median Household Income): 2017: Third Quarter
14th Annual Demographia International Housing Affordability Survey

Rank	Nation	Metropolitan Market	Median Multiple
277	Australia	Gold Coast, QLD-NSW	8.4
277	U.S.	San Diego, CA	8.4
279	Australia	Sunshine Coast, QLD	8.5
279	U.K.	London (Greater London Authority)	8.5
281	N.Z.	Auckland	8.8
282	N.Z.	Taraunga-Western Bay of Plenty	8.9
283	U.S.	Salinas-Monterey, CA	9.1
283	U.S.	San Francisco, CA	9.1
285	U.S.	Honolulu, HI	9.2
286	U.S.	Los Angeles, CA	9.4
286	U.S.	Santa Barbara, CA	9.4
288	Australia	Melbourne, VIC	9.9
289	U.S.	San Jose, CA	10.3
290	U.S.	Santa Cruz, CA	10.4
291	Canada	Vancouver, BC	12.6
292	Australia	Sydney, NSW	12.9
293	China	Hong Kong	19.4

Median Multiple: Median house price divided by median household income

SCHEDULE 3
ALL HOUSING MARKETS BY NATION: 2017: Third Quarter
14th Annual Demographia International Housing Affordability Survey

International Affordability Rank	Major Market Rank	National Rank	Nation	Housing market	Median Multiple*	Median Price	Median Household Income
260	77	17	Australia	Adelaide, SA	6.6	$450,000	$68,500
191		6	Australia	Alice Springs, NT	4.6	$476,500	$102,800
226		8	Australia	Ballarat, VIC	5.4	$337,000	$62,200
226		8	Australia	Bendigo, VIC	5.4	$334,500	$62,300
256	75	15	Australia	Brisbane, QLD	6.3	$516,900	$81,700
226		8	Australia	Bundaberg, QLD	5.4	$280,000	$51,900
246		12	Australia	Cairns, QLD	5.9	$410,000	$70,000
243		11	Australia	Canberra, ACT	5.8	$640,000	$110,500
167		5	Australia	Darwin, NT	4.3	$495,000	$115,600
257		16	Australia	Fraser Coast, QLD	6.5	$310,000	$47,400
267		18	Australia	Geelong, VIC	7.1	$492,000	$69,100
72		1	Australia	Gladstone, QLD	3.2	$279,500	$88,300
277		19	Australia	Gold Coast, QLD-NSW	8.4	$601,850	$71,300
255		14	Australia	Hobart, TAS	6.2	$426,300	$68,600
147		3	Australia	Mackay, QLD	4.1	$307,300	$75,700
288	88	21	Australia	Melbourne, VIC	9.9	$817,000	$82,800
246	72	12	Australia	Perth, WA	5.9	$504,300	$86,200
130		2	Australia	Rockhampton, QLD	3.9	$264,500	$68,500
279		20	Australia	Sunshine Coast, QLD	8.5	$560,000	$66,100
292	91	22	Australia	Sydney, NSW	12.9	$1,177,600	$91,600
214		7	Australia	Toowoomba, QLD	5.0	$343,500	$68,200
158		4	Australia	Townsville, QLD	4.2	$316,300	$75,400
				Median Market	5.9		
246		37	Canada	Barrie, ON	5.9	$490,900	$83,800
130		24	Canada	Belleville, ON	3.9	$255,400	$66,300
212		32	Canada	Brantford, ON	4.9	$345,900	$71,300
147	35	27	Canada	Calgary, AB	4.1	$420,100	$101,600
231		34	Canada	Cambridge, ON	5.5	$442,800	$80,100
24		7	Canada	Cape Breton, NS	2.7	$149,900	$55,900
16		5	Canada	Charlottetown, PEI	2.6	$175,300	$66,800
16		5	Canada	Chatham, ON	2.6	$154,200	$60,300
263		41	Canada	Chilliwack	6.8	$471,400	$69,100
111	23	22	Canada	Edmonton, AB	3.7	$358,200	$96,400
4		2	Canada	Fort McMurray, AB	2.2	$434,700	$197,400
271		43	Canada	Fraser Valley	7.7	$627,100	$81,200
4		2	Canada	Fredericton, NB	2.2	$155,100	$69,500
250		38	Canada	Guelph, ON	6.0	$505,900	$84,200
85		17	Canada	Halifax, NS	3.4	$249,800	$73,500
260		39	Canada	Hamilton, ON	6.6	$513,800	$78,300
176		29	Canada	Kamloops. BC	4.4	$342,000	$77,200
260		39	Canada	Kelowna, BC	6.6	$495,300	$74,900
106		20	Canada	Kingston, ON	3.6	$265,800	$73,800
231		34	Canada	Kitchener-Waterloo, ON	5.5	$438,700	$80,100
80		15	Canada	Lethbridge, AB	3.3	$254,800	$77,000
147		27	Canada	London	4.1	$278,300	$67,100
2		1	Canada	Moncton, NB	2.1	$139,400	$65,300
181	51	30	Canada	Montréal, QC	4.5	$294,600	$65,200
268		42	Canada	Nanaimo, BC	7.2	$479,500	$66,200
238		36	Canada	Oshawa, ON	5.7	$502,400	$88,900
130	31	24	Canada	Ottawa-Gatineau, ON-QC	3.9	$335,100	$85,500
191		31	Canada	Peterborough, ON	4.6	$306,900	$67,200

SCHEDULE 3 ALL HOUSING MARKETS BY NATION: 2017: Third Quarter *14th Annual Demographia International Housing Affordability Survey*							
International Affordability Rank	Major Market Rank	National Rank	Nation	Housing market	Median Multiple*	Median Price	Median Household Income
85		17	Canada	Québec, QC	3.4	$236,500	$69,000
80		15	Canada	Red Deer, AB	3.3	$285,700	$87,500
72		13	Canada	Regina, SK	3.2	$283,600	$89,000
24		7	Canada	Saguenay, QC	2.7	$169,000	$62,500
8		4	Canada	Saint John, NB	2.3	$153,200	$66,200
52		10	Canada	Sarnia, ON	3.0	$220,600	$73,400
120		23	Canada	Saskatoon, SK	3.8	$330,100	$87,500
92		19	Canada	Sherbrooke, QC	3.5	$198,700	$56,700
218		33	Canada	St. Catharines-Niagara, ON	5.2	$348,200	$66,500
72		13	Canada	St. John's, NL	3.2	$264,300	$81,600
63		12	Canada	Thunder Bay, ON	3.1	$220,500	$71,000
273	81	44	Canada	Toronto, ON	7.9	$645,800	$81,300
24		7	Canada	Trois-Rivières, QC	2.7	$145,100	$54,700
291	90	46	Canada	Vancouver, BC	12.6	$927,300	$73,400
274		45	Canada	Victoria, BC	8.1	$601,600	$74,000
130		24	Canada	Whitehorse, YT	3.9	$385,700	$99,700
52		10	Canada	Windsor, ON	3.0	$204,800	$68,400
106		20	Canada	Winnipeg, MB	3.6	$268,300	$74,100
				Median Market	3.9		
293	92	1	China	Hong Kong	19.4	$6,192,000	$319,000
111		3	Ireland	Cork	3.7	€202,000	€54,600
202	59	5	Ireland	Dublin	4.8	€300,000	€63,000
140		4	Ireland	Galway	4.0	€197,000	€49,200
4		1	Ireland	Limerick	2.2	€120,000	€55,800
24		2	Ireland	Waterford	2.7	€136,400	€51,300
				Median Market	3.7		
202	59	2	Japan	Tokyo-Yokohama*	4.8	¥32,668,000	¥6,841,000
92	19	1	Japan	Osaka-Kobe-Kyoto*	3.5	¥20,814,000	¥5,988,000
				Median Market*	4.2		
281	84	7	N.Z.	Auckland	8.8	$836,700	$94,800
226		2	N.Z.	Christchurch	5.4	$448,300	$83,700
226		2	N.Z.	Dunedin	5.4	$363,300	$67,400
257		6	N.Z.	Hamilton-Waikato	6.5	$530,100	$81,800
253		5	N.Z.	Napier-Hastings	6.1	$409,100	$67,000
181		1	N.Z.	Palmerston North-Manawatu	4.5	$278,000	$62,000
282		8	N.Z.	Taraunga-Western Bay of Plenty	8.9	$617,000	$69,100
231		4	N.Z.	Wellington	5.5	$508,700	$92,100
				Median Market	5.8		
202	59	1	Singapore	Singapore	4.8	$413,700	$85,400
147		6	U.K.	Aberdeen	4.1	£183,100	£44,400
140		4	U.K.	Belfast	4.0	£129,700	£32,100
214	64	23	U.K.	Birmingham & West Midlands	5.0	£160,000	£32,100
147	35	6	U.K.	Blackpool & Lancashire	4.1	£135,000	£33,000
269	80	32	U.K.	Bournemouth & Dorsett	7.3	£280,000	£38,100
263	78	30	U.K.	Bristol-Bath	6.8	£270,000	£39,900
181		14	U.K.	Cardiff	4.5	£156,000	£34,900
167	44	9	U.K.	Derby & Derbyshire	4.3	£158,000	£37,000

SCHEDULE 3 ALL HOUSING MARKETS BY NATION: 2017: Third Quarter *14th Annual Demographia International Housing Affordability Survey*							
International Affordability Rank	Major Market Rank	National Rank	Nation	Housing market	Median Multiple*	Median Price	Median Household Income
130		2	U.K.	Dundee	3.9	£133,500	£34,400
181	51	14	U.K.	Edinburgh	4.5	£182,600	£40,500
111		1	U.K.	Falkirk	3.7	£125,000	£33,600
130	31	2	U.K.	Glasgow	3.9	£135,600	£34,700
202	59	21	U.K.	Hull & Humber	4.8	£150,000	£31,300
167	44	9	U.K.	Leeds & West Yorkshire	4.3	£143,000	£32,900
218	65	24	U.K.	Leicester & Leicestershire	5.2	£185,000	£35,500
167	44	9	U.K.	Liverpool & Merseyside	4.3	£138,500	£31,900
279	83	33	U.K.	London (Greater London Authority)	8.5	£463,000	£54,200
265	79	31	U.K.	London Exurbs (E & SE England)	6.9	£300,000	£43,400
191	55	18	U.K.	Manchester & Greater Manchester	4.6	£152,500	£33,100
176	49	12	U.K.	Middlesbrough & Durham	4.4	£111,000	£25,300
176	49	12	U.K.	Newcastle & Tyneside	4.4	£135,000	£30,900
191		18	U.K.	Newport	4.6	£161,000	£34,900
243		27	U.K.	Northampton & Northamptonshire	5.8	£207,000	£35,500
191	55	18	U.K.	Nottingham & Nottinghamshire	4.6	£152,000	£32,800
181		14	U.K.	Perth	4.5	£177,000	£39,500
253	74	29	U.K.	Plymouth & Devon	6.1	£220,000	£35,900
147	35	6	U.K.	Sheffield & South Yorkshire	4.1	£132,000	£31,900
181	51	14	U.K.	Stoke on Trent & Staffordshire	4.5	£159,700	£35,200
140		4	U.K.	Swansea	4.0	£127,500	£31,500
250		28	U.K.	Swindon & Wiltshire	6.0	£240,000	£39,900
218		24	U.K.	Telford & Shropshire	5.2	£182,500	£35,200
202	59	21	U.K.	Warrington & Cheshire	4.8	£192,500	£40,100
238		26	U.K.	Warwickshire	5.7	£234,000	£41,200
				Median Market	4.5		
24		17	U.S.	Akron, OH	2.7	$144,100	$52,800
72		58	U.S.	Albany, NY	3.2	$216,100	$67,500
130		101	U.S.	Albuquerque, NM	3.9	$201,600	$52,200
63		50	U.S.	Allentown, PA	3.1	$197,800	$64,500
41		30	U.S.	Amarillo, TX	2.9	$162,700	$55,800
92		71	U.S.	Anchorage, AK	3.5	$294,000	$84,200
140		105	U.S.	Ann Arbor, MI	4.0	$268,200	$67,200
202		139	U.S.	Asheville, NC	4.8	$251,000	$51,800
72	14	58	U.S.	Atlanta, GA	3.2	$204,300	$64,100
80		63	U.S.	Atlantic City, NJ	3.3	$191,600	$58,200
147	35	109	U.S.	Austin, TX	4.1	$296,400	$72,700
191		133	U.S.	Bakersfield, CA	4.6	$234,900	$51,100
85	16	66	U.S.	Baltimore, MD	3.4	$270,000	$78,600
120		92	U.S.	Baton Rouge, LA	3.8	$203,500	$53,800
63		50	U.S.	Beaumont, TX	3.1	$157,800	$50,600
111	23	86	U.S.	Birmingham, AL	3.7	$198,700	$53,500
147		109	U.S.	Boise, ID	4.1	$232,200	$56,500
231	67	152	U.S.	Boston, MA-NH	5.5	$464,100	$84,400
270		164	U.S.	Boulder, CO	7.4	$563,500	$76,400
167		122	U.S.	Bremerton, WA	4.3	$301,000	$70,800
181		129	U.S.	Bridgeport, CT	4.5	$419,300	$92,300
72		58	U.S.	Brownsville, TX	3.2	$123,000	$38,000
33	4	22	U.S.	Buffalo, NY	2.8	$151,600	$54,800
16		11	U.S.	Canton, OH	2.6	$137,200	$52,000
176		127	U.S.	Cape Coral, FL	4.4	$240,000	$54,200
10		5	U.S.	Cedar Rapids, IA	2.4	$156,500	$64,900

SCHEDULE 3
ALL HOUSING MARKETS BY NATION: 2017: Third Quarter
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International Affordability Rank	Major Market Rank	National Rank	Nation	Housing market	Median Multiple*	Median Price	Median Household Income
181		129	U.S.	Charleston, SC	4.5	$267,100	$59,100
120	26	92	U.S.	Charlotte, NC-SC	3.8	$233,200	$61,400
111		86	U.S.	Chattanooga, TN-GA	3.7	$178,100	$47,700
120	26	92	U.S.	Chicago, IL	3.8	$255,600	$67,600
24	2	17	U.S.	Cincinnati, OH-KY-IN	2.7	$169,100	$61,700
24	2	17	U.S.	Cleveland, OH	2.7	$146,000	$53,400
218		147	U.S.	College Station, TX	5.2	$227,000	$43,300
176		127	U.S.	Colorado Springs, CO	4.4	$283,900	$65,200
63		50	U.S.	Columbia, SC	3.1	$165,100	$53,500
63	11	50	U.S.	Columbus, OH	3.1	$193,900	$61,800
85		66	U.S.	Corpus Christi, TX	3.4	$188,900	$55,100
120	26	92	U.S.	Dallas-Fort Worth, TX	3.8	$249,000	$65,400
10		5	U.S.	Davenport, IA-IL	2.4	$129,300	$53,900
24		17	U.S.	Dayton, OH	2.7	$142,500	$52,700
147		109	U.S.	Daytona Beach, FL	4.1	$195,000	$47,200
238	69	156	U.S.	Denver, CO	5.7	$418,100	$73,700
41		30	U.S.	Des Moines, IA	2.9	$198,200	$67,300
41	7	30	U.S.	Detroit, MI	2.9	$167,600	$57,500
41		30	U.S.	Duluth, MN	2.9	$151,000	$52,500
191		133	U.S.	Durham, NC	4.6	$262,200	$57,500
92		71	U.S.	El Paso, TX	3.5	$152,800	$43,100
14		9	U.S.	Erie, PA	2.5	$123,300	$50,200
231		152	U.S.	Eugene, OR	5.5	$270,500	$48,900
92		71	U.S.	Fayetteville, AR-MO	3.5	$183,700	$53,100
41		30	U.S.	Fayetteville, NC	2.9	$134,300	$46,400
52		41	U.S.	Flint, MI	3.0	$133,000	$45,000
217		146	U.S.	Fort Collins, CO	5.1	$350,000	$68,100
181		129	U.S.	Fort Walton Beach, FL	4.5	$269,900	$60,000
218		147	U.S.	Fresno, CA	5.2	$260,700	$49,900
16		11	U.S.	Ft. Wayne, IN	2.6	$135,500	$52,800
191		133	U.S.	Gainesville, FL	4.6	$214,600	$46,400
52	9	41	U.S.	Grand Rapids, MI	3.0	$182,400	$61,700
212		144	U.S.	Greeley, CO	4.9	$321,000	$64,900
41		30	U.S.	Green Bay, WI	2.9	$170,600	$59,400
92		71	U.S.	Greensboro, NC	3.5	$163,800	$47,300
120		92	U.S.	Greenville, SC	3.8	$199,500	$51,900
41		30	U.S.	Gulfport, MS	2.9	$137,600	$47,600
52		41	U.S.	Hagerstown, MD-WV	3.0	$172,900	$57,200
33		22	U.S.	Harrisburg, PA	2.8	$174,400	$63,000
72	14	58	U.S.	Hartford, CT	3.2	$238,700	$74,300
285	86	171	U.S.	Honolulu, HI	9.2	$760,200	$82,500
111	23	86	U.S.	Houston, TX	3.7	$233,900	$63,200
72		58	U.S.	Huntsville, AL	3.2	$192,000	$59,600
52	9	41	U.S.	Indianapolis, IN	3.0	$173,700	$58,100
92		71	U.S.	Jackson, MS	3.5	$180,600	$51,900
140	33	105	U.S.	Jacksonville, FL	4.0	$232,000	$58,200
33		22	U.S.	Kalamazoo, MI	2.8	$150,000	$53,300
63	11	50	U.S.	Kansas City, MO-KS	3.1	$197,800	$62,900
130		101	U.S.	Kennewick, WA	3.9	$246,300	$62,500
63		50	U.S.	Killeen , TX	3.1	$164,000	$53,500
92		71	U.S.	Knoxville, TN	3.5	$180,200	$51,100
120		92	U.S.	Lakeland, FL	3.8	$180,900	$47,500
52		41	U.S.	Lancaster, PA	3.0	$190,000	$62,800

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16		11	U.S.	Lansing, MI	2.6	$142,400	$54,600
202		139	U.S.	Laredo, TX	4.8	$177,000	$36,500
201	58	138	U.S.	Las Vegas, NV	4.7	$261,600	$55,700
52		41	U.S.	Lexington, KY	3.0	$168,000	$55,100
52		41	U.S.	Lincoln, NE	3.0	$183,100	$60,800
24		17	U.S.	Little Rock, AR	2.7	$143,700	$52,700
286	87	172	U.S.	Los Angeles, CA	9.4	$636,000	$67,500
63	11	50	U.S.	Louisville, KY-IN	3.1	$175,700	$55,900
130		101	U.S.	Madison, WI	3.9	$273,600	$70,200
106		83	U.S.	Manchester, NH	3.6	$284,800	$78,100
92		71	U.S.	McAllen, TX	3.5	$131,000	$37,100
85	16	66	U.S.	Memphis, TN-MS-AR	3.4	$172,700	$51,000
218		147	U.S.	Merced, CA	5.2	$256,700	$48,900
257	76	162	U.S.	Miami, FL	6.5	$340,000	$52,600
158	40	114	U.S.	Milwaukee, WI	4.2	$246,900	$59,400
85	16	66	U.S.	Minneapolis-St. Paul, MN-WI	3.4	$257,800	$75,000
41		30	U.S.	Mobile, AL	2.9	$134,300	$46,900
224		150	U.S.	Modesto, CA	5.3	$295,400	$55,600
52		41	U.S.	Montgomery, AL	3.0	$145,700	$48,400
167		122	U.S.	Myrtle Beach, SC	4.3	$205,800	$47,900
265		163	U.S.	Naples, FL	6.9	$429,900	$62,700
120	26	92	U.S.	Nashville, TN	3.8	$234,300	$61,500
85		66	U.S.	New Haven, CT	3.4	$231,400	$67,800
33		22	U.S.	New London, CT	2.8	$203,400	$72,400
147	35	109	U.S.	New Orleans, LA	4.1	$204,300	$50,000
238	69	156	U.S.	New York, NY-NJ-PA	5.7	$419,100	$73,600
111		86	U.S.	Ocala, FL	3.7	$150,000	$40,300
92		71	U.S.	Ogden, UT	3.5	$253,000	$71,900
33	4	22	U.S.	Oklahoma City, OK	2.8	$158,800	$56,400
158		114	U.S.	Olympia, WA	4.2	$284,000	$67,400
33		22	U.S.	Omaha, NE-IA	2.8	$179,000	$63,800
191	55	133	U.S.	Orlando, FL	4.6	$247,900	$53,700
271		165	U.S.	Oxnard, CA	7.7	$632,500	$82,100
158		114	U.S.	Palm Bay, FL	4.2	$220,000	$52,400
111		86	U.S.	Pensacola, FL	3.7	$192,300	$51,700
4		3	U.S.	Peoria, IL	2.2	$128,700	$58,500
92	19	71	U.S.	Philadelphia, PA-NJ-DE-MD	3.5	$238,900	$67,600
158	40	114	U.S.	Phoenix, AZ	4.2	$248,900	$59,500
33	4	22	U.S.	Pittsburgh, PA	2.8	$159,000	$57,400
191		133	U.S.	Port St. Lucie, FL	4.6	$229,900	$49,900
167		122	U.S.	Portland, ME	4.3	$276,400	$65,000
231	67	152	U.S.	Portland, OR-WA	5.5	$389,400	$70,300
181	51	129	U.S.	Providence, RI-MA	4.5	$287,000	$63,400
158		114	U.S.	Provo, UT	4.2	$295,000	$71,000
106	22	83	U.S.	Raleigh, NC	3.6	$267,500	$73,400
41		30	U.S.	Reading, PA	2.9	$174,400	$60,700
250		161	U.S.	Reno, NV	6.0	$355,900	$59,500
140	33	105	U.S.	Richmond, VA	4.0	$258,900	$64,500
238	69	156	U.S.	Riverside-San Bernardino, CA	5.7	$339,900	$59,600
92		71	U.S.	Roanoke, VA	3.5	$181,000	$51,800
16	1	11	U.S.	Rochester, NY	2.6	$145,700	$56,500
10		5	U.S.	Rockford, IL	2.4	$122,200	$51,500
224	66	150	U.S.	Sacramento, CA	5.3	$350,000	$65,600

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41	7	30	U.S.	Saint Louis, MO-IL	2.9	$176,500	$61,200
202		139	U.S.	Salem, OR	4.8	$274,200	$57,300
283		169	U.S.	Salinas-Monterey, CA	9.1	$593,100	$65,400
92		71	U.S.	Salisbury, MD	3.5	$195,000	$56,100
158	40	114	U.S.	Salt Lake City, UT	4.2	$293,000	$69,800
120	26	92	U.S.	San Antonio, TX	3.8	$220,700	$57,500
277	82	168	U.S.	San Diego, CA	8.4	$607,000	$72,500
283	85	169	U.S.	San Francisco, CA	9.1	$900,000	$99,000
289	89	174	U.S.	San Jose, CA	10.3	$1,165,000	$112,700
275		166	U.S.	San Luis Obispo, CA	8.3	$598,800	$72,300
286		172	U.S.	Santa Barbara, CA	9.4	$649,700	$69,100
290		175	U.S.	Santa Cruz, CA	10.4	$828,300	$79,500
275		166	U.S.	Santa Rosa, CA	8.3	$630,200	$75,700
214		145	U.S.	Sarasota, FL	5.0	$273,600	$54,900
8		4	U.S.	Scranton-Wilkes Barre, PA	2.3	$110,000	$48,600
246	72	160	U.S.	Seattle, WA	5.9	$478,500	$80,500
147		109	U.S.	Shreveport, LA	4.1	$171,800	$41,400
52		41	U.S.	Sioux Falls, SD	3.0	$196,500	$65,500
16		11	U.S.	South Bend, IN	2.6	$132,900	$50,300
80		63	U.S.	Spartanburg, SC	3.3	$157,300	$47,700
158		114	U.S.	Spokane, WA	4.2	$229,200	$54,200
130		101	U.S.	Springfield, MA	3.9	$217,300	$56,200
41		30	U.S.	Springfield, MO	2.9	$134,900	$46,400
243		159	U.S.	Stockton, CA	5.8	$353,300	$61,000
10		5	U.S.	Syracuse, NY	2.4	$136,700	$58,100
140		105	U.S.	Tallahassee, FL	4.0	$207,000	$51,900
167	44	122	U.S.	Tampa-St. Petersburg, FL	4.3	$225,000	$52,400
16		11	U.S.	Toledo, OH	2.6	$128,400	$50,000
106		83	U.S.	Trenton, NJ	3.6	$287,700	$79,500
167	44	122	U.S.	Tucson, AZ	4.3	$210,000	$48,700
63		50	U.S.	Tulsa, OK	3.1	$163,800	$52,900
2		2	U.S.	Utica, NY	2.1	$115,000	$53,800
231		152	U.S.	Vallejo, CA	5.5	$417,500	$75,700
92	19	71	U.S.	Virginia Beach-Norfolk, VA-NC	3.5	$224,000	$63,300
202		139	U.S.	Visalia, CA	4.8	$224,900	$47,000
111		86	U.S.	Waco, TX	3.7	$175,000	$47,700
158	40	114	U.S.	Washington, DC-VA-MD-WV	4.2	$408,500	$98,200
14		9	U.S.	Wichita, KS	2.5	$138,400	$55,000
202		139	U.S.	Wilmington, NC	4.8	$246,200	$51,400
80		63	U.S.	Winston-Salem, NC	3.3	$159,400	$48,900
120		92	U.S.	Worcester, MA	3.8	$265,600	$69,400
33		22	U.S.	York, PA	2.8	$177,700	$64,000
1		1	U.S.	Youngstown, OH-PA	1.9	$88,900	$46,100
				Median Market	3.7		

Financial data in local currency.
*Average Multiple (Japan)

ANNEX: USES, METHODS AND SOURCES

Most international housing affordability sources and "city" rating sources focus on higher end housing that would be demanded by executives who might be transferred from one nation to another (expatriates). The *Demographia International Housing Affordability Survey* is unique in focusing on the middle of the market --- housing affordability for average households.

Further, the focus is on housing markets, rather than higher-cost inner areas or expensive neighborhoods. This is an important distinction. The data in the *Demographia International Housing Affordability Survey* does not relate, for example to Belgravia in London, New York's Upper East Side or Beverly Hills in Los Angeles. It rather encompasses entire metropolitan markets, which for example, in the New York metropolitan area includes more than 20 counties in the states of New York, New Jersey and Pennsylvania[82] (where included housing can be 75 miles [120 kilometers] or more from the upscale areas of the urban core, where prices are the highest).

Geographical Coverage: The nine nations and corresponding housing markets that are included in the *13th Annual Demographia International Housing Affordability Survey* have sufficient current sources of house prices and household income data to estimate housing affordability using the Median Multiple (the similar "Average Multiple" is used in Japan).

Demographia receives periodic requests to expand its coverage to other nations. The addition of continental European nations, mainland China and India has been most frequently requested. *Demographia* would be pleased to add other nations and will do so wherever consistent data of sufficient quality can be identified. Readers are encouraged to contact the authors with any such information.

House Characteristics: The indexes and data on which the *Survey* is based reflect the majority of existing housing in each of the national markets. At the same time, there are differences in house types, housing characteristics and lot size between the included nations and markets. The *Demographia International Housing Affordability Survey* does not adjust the Median Multiples to reflect these differences. For example, the average size of housing, particularly new housing, is abnormally small by New World standards in the United Kingdom and Hong Kong.[83]

Methods: Median house price information is obtained from leading metropolitan reporting agencies and includes the housing stock as reported upon. Where only average house prices are available, median house prices are estimated from historic conversion factors, except in Japan. The principal sources are real estate time series that have become established as authoritative, national sales transaction registries and other government sources.

Median household income data is estimated for each housing markets using national census data or housing market data from other national surveys. The income base is then adjusted to account for

[82] As defined by the United States Bureau of Management and the Budget.
[83] See *2nd Annual Demographia International Housing Affordability Survey*, Pages 16-18.

changes to produce an up-to-date estimate, using the best available indicators of annual income changes. This requires periodic recalibration of base year data to reflect the latest available data. For the 2018 edition, recalibrations occurred in Australia and Canada, due to new census data, New Zealand due to a government restatement of household incomes and the United Kingdom.

Caution is urged in time-series comparisons in individual markets. Changes in data sources, base year income information, housing data sources and geographical definitions can make precise year to year comparisons less reliable. The most reliable comparisons are between the housing affordability rating categories ("affordable," moderately unaffordable," "seriously unaffordable" and "severely unaffordable").[84]

Sources: The following principal sources have been consulted:

Arkansas Realtors Association
Australian Bureau of Statistics
Australian Property Monitors
Bank of Canada
Bank of England
Bank of Ireland
Calgary Real Estate Board
Canada Mortgage and Housing Corporation
Canadian Home Builders Association
Canadian Real Estate Association
Census and Statistical Office: Government of Hong Kong
Central Statistics Office, Ireland
Chambre immobilière du Grand Montréal
Communities and Local Government (Ministry), United Kingdom
Conference Board of Canada
Department of the Environment, Heritage and Local Government (Ireland)
Domain.com.au (Australia)
Edmonton Real Estate Board
Federal Reserve Board (United States)
Fédération des chambres immobilières du Québec
Harvard University Joint Center on Housing
Housing and Development Board (Singapore)
Housing Industry Association (Australia)
Ireland Environment, Heritage and Local Government
Japan Statistics Bureau
John Burns Real Estate Consulting
The Land Institute of Japan
Land Registry of England and Wales

[84] Demographia attempts to use the most reliable available data at the time of report preparation. This necessitates adopting more representative sources as they become available, including new sources and updates.

The Land Registry (Hong Kong)
Michigan Realtors
National Association of Home Builders (USA)
National Association of Realtors (USA)
National Statistics (United Kingdom)
Northern Ireland Research and Statistics Agency
Real Estate Institute of Australia
Real Estate Institute of New South Wales
Real Estate Institute of New Zealand
Real Estate Institute of Northern Territory
Real Estate Institute of Queensland
Real Estate Institute of Tasmania
Real Estate Institute of Victoria
Real Estate Institute of Western Australia
Realestateview.com.au
Registers of Scotland
Reserve Bank of Australia
Reserve Bank of New Zealand
Residential Property Price Register of the Property Services Regulatory Authority (Ireland)
realestate.com.au
Singapore Department of Statistics
Singapore Real Estate Exchange (SRX)
Statistics Canada
Statistics New Zealand
Title Guaranty Hawaii
Toronto Real Estate Board
United Kingdom Department of Communities and Local Government
United States Department of Commerce: Bureau of Economic Analysis
United States Department of Commerce: Bureau of the Census
United States Department of Housing and Urban Development
Urban Development Institute of Australia
Yukon Government
Wells Fargo Bank
Zillow.com

Expanded Notes on Selected Figures:

Figure 2: House Price-to-Income Ratios: Reserve Bank of Australia data. Figure courtesy of Frontier Centre for Public Policy (https://www.fcpp.org/posts/housing-affordability-and-the-standard-of-living-in-toronto)

Figure 4: Housing Affordability & Land Regulation: In the United States, more restrictive regulation markets (Table 1) include those classified as "growth management," "growth control,"

"containment" and "contain-lite" in *From Traditional to Reformed A Review of the Land Use Regulations in the Nation's 50 largest Metropolitan Areas* (Brookings Institution, 2006) as well as additional markets Demographia has determined other U.S. metropolitan areas to have urban containment policy or other policies that have similar effects (New York, Boston, Chicago, Minneapolis-St. Paul, Washington and Honolulu). Outside the United States, more restrictively regulated markets are identified based upon the extent of their use of urban containment strategies (significant restriction or prohibition of urban fringe development). This includes all markets in the United Kingdom (principally under the Town and Country Planning Act), Ireland (under the National Spatial Strategy), Hong Kong and all of the markets of Australia and New Zealand. In Canada, urban containment policy has been adopted in Toronto, Montréal, Vancouver, Ottawa and Calgary. Markets not classified as more restrictively regulated are classified as liberal (see Table 3).

Figure 10: Middle-Income Housing Affordability: New Zealand: Median Multiple values for 2014 through 2016 scaled using change rate from 2013 to 2017 to account for restatement of median household incomes by Statistics New Zealand.

Table 11
Housing Market Selection Criteria

Nation	Markets Included (Where Sufficient Data is Available)
Australia	Housing markets corresponding to urban centres over 50,000 population
Canada	Housing markets over 75,000 population
China	Hong Kong
Ireland	Housing markets over 50,000 population
Japan	Two largest markets (only markets available)
New Zealand	Markets corresponding to urban areas over 75,000 population
Singapore	Singapore
United Kingdom	Markets corresponding to urban areas over 150,000 population and London Exurbs (E & SE England).
United States	Housing markets over 250,000 population
Selected additional markets. Housing markets are generally metropolitan areas (labour market areas) or their equivalent.	

Table 12
Footer Illustrations: New Houses (Left to Right)

• Suburban Kansas City, United States • Suburban Montréal, Canada • East of England (London Exurbs), U.K. • Suburban Tseung Kwan O (Hong Kong)	• Suburban Dublin, Ireland • Suburban Auckland, New Zealand • Suburban Adelaide, Australia

AUTHOR BIOGRAPHIES

Wendell Cox

Wendell Cox is co-author of the *Demographia International Housing Affordability Survey.* He is a public policy consultant and principal of Demographia, an international public policy firm.. He is a senior fellow at the Center for Opportunity Urbanism (Houston), senior fellow for housing affordability and municipal policy at the Frontier Centre for Public Policy (Winnipeg) and a member of the advisory board of the Center for Demographics and Policy at Chapman University in California.

Wendell Cox has also served as a visiting professor at the Conservatoire National des Arts et Metiers in Paris (a national university). He has served as vice-president of CODATU, a Lyon (France) based international research organization dedicated to improving transport in developing world urban areas. He is author of the *Evolving Urban Form* series at newgeography.com. He authored the "Measuring Urban Cores and Suburbs" chapter in the Massachusetts Institute of Technology volume *Infinite Suburbia,* published by the Princeton Architectural Press. Among his most recent policy reports were *A Question of Values: Urban Containment Policy and Middle-Income Housing Affordability*, *Canada's Middle-Income Housing Affordability Crisis*, *Restrictive Land-Use Regulation: Strategies, Effects and Solutions*, and *Improving the Competitiveness of Metropolitan Areas* for the Frontier Centre for Public Policy, *Putting People First: An Alternative Perspective with and Evaluation of the NCE Cities "Trillion Dollar" Report*, *Best Cities for Minorities: Gauging the Economics of Opportunity* (co-author with Joel Kotkin) for the Center for Opportunity Urbanism, for the Frontier Centre for Public Policy *Evaluation of Plan Bay Area* for the Pacific Research Institute and a "framing essay" entitled *Toward More Prosperous Cities*. He is also author of the *Demographia Residential Land and Regulation Cost Index*.

Wendell Cox has lectured widely, including a month long tour to all Australian state and territory capitals and university lectures in the United Kingdom, France, China, Egypt and Australia. He has also conducted transport and urban planning training seminars in Romania, Togo and Ethiopia, He has completed projects in the United States, Western Europe, Canada, Australia and New Zealand in urban policy, demographics and transport.

He was appointed to three terms on the Los Angeles County Transportation Commission by Mayor Tom Bradley and to the Amtrak Reform Council by Speaker of the U. S. House of Representatives Newt Gingrich.

Demographia annually publishes *Demographia World Urban Areas,* the only annual list of world urban areas (agglomerations) over 500,000 population with coordinate urban land area, population and population density estimates. Demographia sponsors demographia.com and www.publicpurpose.com. The www.publicpurpose.com website has been twice honored by the *National Journal* as one of the nation's top internet transport sites.

In 2004 he teamed with Hugh Pavletich of Performance Urban Planning to develop the *Demographia International Housing Affordability Survey.*

Hugh Pavletich

Hugh Pavletich, the co-author of the *Demographia International Housing Affordability Survey,* resides in "severely unaffordable" (6.1 Median Multiple) Christchurch, New Zealand, which since 4 September 2010 has experienced in excess of 13,000 earthquakes. He has written extensively on these issues.

He operates the archival website Performance Urban Planning and is the Managing Director of Pavletich Properties Ltd, a commercial property development and investment company.

He commenced his working life as a farm worker and wool classer (wool classifier) in 1967 and moved to Christchurch in 1980, where he started developing small factory units and has developed commercial and industrial property on freehold and Maori leasehold land in other centers of the South Island as well.

His industry involvement commenced when elected President of the South Island Division of the Property Council of New Zealand (then the Building Owners & Managers Association – BOMA) soon after its inception in 1991, which he led for four years.

He has had extensive involvement with public policy issues of local authority financial management, land use regulation and heritage. In 2004, he was elected a fellow of the Urban Development Institute of Australia (UDIA) for services to the industry.

He felt there was a need for an international measure of housing affordability and teamed up with Wendell Cox in 2004, to develop the annual *Demographia International Housing Affordability Survey.*

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