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How vulnerable are housing markets to a rise in interest rates?

- With interest rates still close to historical lows and increasing signs of a pickup in global inflation, a key question for global financial stability is how vulnerable residential real estate markets are to a rise in interest rates.
- In assessing vulnerability, a natural place to start is to look at valuation ratios. This note examines the ratio of residential house prices to household disposable incomes over a 40-year period for a set of 21 countries. The analysis suggests that valuation ratios for residential real estate are currently high in a number of countries but interestingly this is not the case for the largest economies in the sample, namely the United States, Japan and Germany.
- The sample contains 47 booms in residential house prices. The median boom lasts 5.5 years and is associated with an increase in the ratio of house prices to household disposable incomes of 45%. Countries currently in a housing boom include Canada, Australia, New Zealand and Luxembourg.
- The sample contains 36 housing busts. The median bust lasts 6 years and is associated with a decrease in the price-to-income ratio of 34.4%. Countries currently in a housing downturn include Japan, Italy and Spain.
- In addition to valuation ratios, high leverage may pose a source of risk. However it turns out that household indebtedness has fallen significantly in most advanced economies over the last five years.
- Finally there are important variations in financing patterns across countries and over time. Within the euro zone the share of fixed-rate mortgages in new financing has increased significantly in a number of countries over recent years. These contracts lock in borrowing costs although higher long-term mortgage rates may still weigh on housing valuations and thus create negative wealth effects for all homeowners. Borrowers with adjustable-rate contracts are in principle more exposed to a rise in borrowing costs. However short-term interest rates are not currently expected to move up significantly in the near term in the euro zone.

After an extended period of exceptionally low interest rates, there are increasing signs of a pickup in global inflation. As a result, a number of the world's major central banks are expected to gradually tighten policy over the coming years. In anticipation of this, long-term interest rates in the United States and Europe have risen significantly from the historical lows they had reached in 2016. If the benign outlook for the world economy persists, these interest rates could rise significantly more.

Valuation ratios in residential real estate around the world

To what extent may such a rise in interest rates pose a risk to global financial stability? A key market in this respect is the housing market since interest rates are a key factor in the decision to invest in real estate. Higher interest rates may influence the demand/supply imbalance in the market and hence property prices. Through their effect on property prices they may also influence the net equity of the homeowner. This in turn may influence economic confidence and hence spending decisions. A natural place to start is to look at current valuation ratios in housing markets globally and to put them into historical perspective.

House prices to household disposable incomes

(decile relative to country history since 1975)

France	8	Sweden	10
Germany	3	Denmark	8
Italy	4	Finland	6
Spain	5	Norway	10
Belgium	9	Japan	1
Luxembourg	10	South Korea	1
Netherlands	7	Australia	10
USA	4	Canada	10
United Kingdom	10	New Zealand	10
Ireland	7	South Africa	8
Switzerland	6		

Note: For each country, the latest available (Q3 2016) value of the price-to-income ratio is compared to the historical distribution of price-to-income ratios for the country. The reported number is the corresponding decile of the distribution, i.e., a high number corresponds to a large current price-to-income ratio compared to the country's history since 1975.

Table 1 Sources: Dallas Fed, BNP Paribas

The present analysis uses the ratio of residential real estate prices to household disposable incomes (henceforth price-to-income ratio) based on data compiled by the Federal Reserve Bank of Dallas[1]. The data used in the present note cover 21 countries from around the world from 1975 to the third quarter of 2016.

The first idea of the analysis is to construct indices which compare the current valuation ratio of the housing market in a given country to a country's history since 1975. In other words, for a given country an index value of 100 represents the average ratio of house prices to household disposable incomes for that country since 1975. This is a way of eliminating country fixed effects (which could be due to subsidies, regulatory differences, land restrictions etc.) and simplifies cross-country comparisons.

Table 1 reports in which decile of the historical distribution the price-to-income ratio was located as of the third quarter of 2016 for a given country. In other words, a high decile corresponds to a large current price-to-income ratio compared to the country's history since 1975. For a number of countries, current valuation ratios are at or close to historical highs. These include the United Kingdom, Australia, Canada, New Zealand, Norway, Sweden and Luxembourg. Valuations also seem rather high (eighth or ninth decile) in France, Belgium, Denmark and South Africa. In terms of potential spillover effects and their implications for global financial stability, the more reassuring feature of the table is that for the three largest economies in the sample, valuation levels seem moderate: in the fourth decile for the United States, the first decile for Japan and the third decile for Germany. In Italy and Spain, valuation ratios are also moderate. Thus while there are signs of high valuation ratios in some markets, this is not a global phenomenon.

In addition to valuation levels, their evolution over the recent period is of interest. Indeed, a country may have been expensive for a long time already, so a high percentile rank would be less of a source of concern. Figure 1 shows the evolution of the price-to-income ratio over the last five years in relation to the current valuation decile as reported in Table 1. This allows a more nuanced interpretation than just looking at current valuation ratios. Among the countries with high current valuations, many have seen significant growth in valuation over the last five years, notably New Zealand, Australia, Luxembourg and Canada and, to a lesser extent, the United Kingdom and Sweden. As can be seen from Figures 1 and 2, this stands in contrast to France where valuations have declined significantly over the last five years even though they remain relatively high in historical comparison. In Belgium, Denmark, Norway and South Africa, valuation ratios have not moved much over the last five years.

An interesting case is Germany, as illustrated in Figure 3. The much commented run-up in German house prices over recent years still only places the valuation ratio in the third decile of the historical distribution. This is simply due to the fact that the recent run-up started from historically low valuation ratios: the

[1] The original dataset is described in Mack, Adrienne and Enrique Martínez-García (2011), "A Cross-Country Quarterly Database of Real House Prices: A Methodological Note."

Recent evolution v. historical perspective

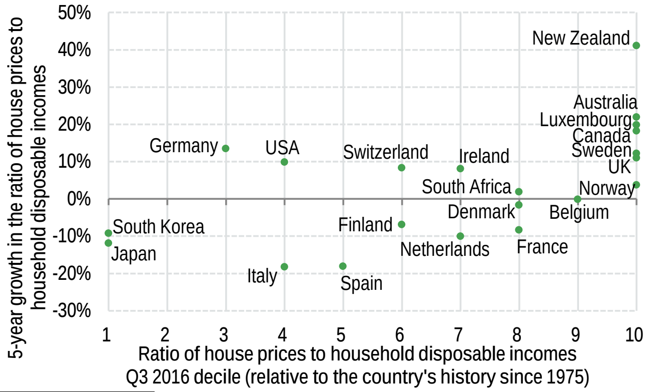

Figure 1 Sources: Dallas Fed, BNP Paribas

Price-to-income ratios for selected countries I

(Index value of 100 corresponds to country mean since 1975)

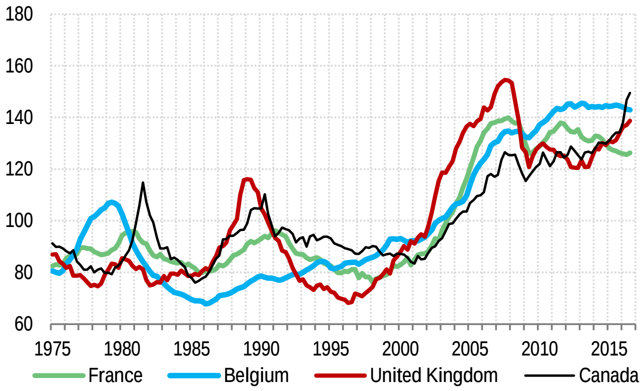

Figure 2 Sources: Dallas Fed, BNP Paribas

Price-to-income ratios for selected countries II

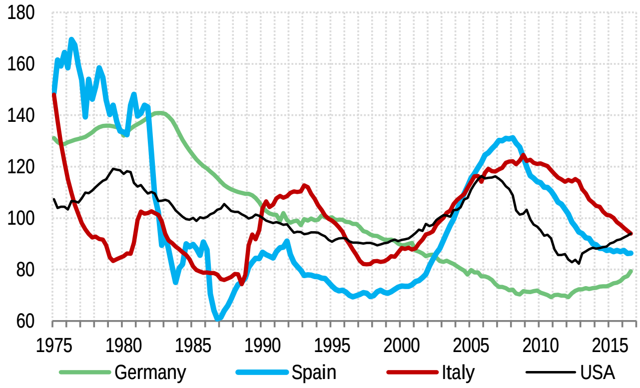

Figure 3 Sources: Dallas Fed, BNP Paribas

price-to-income ratio in Germany had been declining steadily from the early 1980s to around 2012. In the United States as well, house prices have risen by around 10% over the last five years but the price-to-income ratio is still only in the fourth decile of the historical distribution. In the case of the United States,this is explained by the fact that the price-to-income ratio fell by close to 30% in the aftermath of the 2007-08 financial crisis. In Italy and Spain the continued fall in valuation ratios over the last five years has simply brought these ratios back roughly to their historical averages (fourth and fifth decile, respectively).

Housing booms

What are some of the key characteristics of housing booms in the data? For the purpose of the analysis, a housing boom is defined as any period over which the price-to-income ratio increases by at least 20%. A boom is considered to have ended as soon as there is a two-year period over which there is a price decline. According to this definition, there were 47 housing booms in the sample of 21 countries from 1975 to 2016 considered here. Table 2 presents summary statistics.

As can be seen from the table, the median increase in the price-to-income ratio during a housing boom is 45% and the median duration of a housing boom is 5.5 years. However there is large variation around these median figures, as indicated by the large standard deviations in the sample (30.3 and 4.7 respectively). In some cases the increases in the price-to-income ratios were very large. Ireland experienced the largest boom on this measure between the second quarter of 1995 and the first quarter of 2007: the price-to-income ratio increased by 138.5% over this period. There are four other housing booms with increases in the price-to-income ratio in excess of 100% in the sample: the Netherlands between 1990 and 2009, the United Kingdom between 1996 and 2007, South Africa between 1997 and 2007 and Belgium between 1986 and 2012. The Belgian boom is also the longest on record in the sample at 25.8 years. The following countries are currently experiencing a housing boom according to the definition used here: Canada, Australia, New Zealand and Luxembourg.

Housing booms

	Increase in price-income ratio (%)	Length of boom (years)
Mean	54.1	7.1
Median	45.0	5.5
Standard deviation	30.3	4.7
Min	20.4	2.0
10th percentile	26.5	2.9
90th percentile	98.0	11.6
Max	138.5	25.8
Number of observations: 47		

Note: A housing boom is defined as any period over which the price-to-income ratio increases by at least 20% and over which there is never more than a two-year period during which there is a price decline (1975-present, 21 countries listed in Table 1).

Table 2 Sources: Dallas Fed, BNP Paribas

Housing busts

	Fall in price-income ratio (%)	Length of bust (years)
Mean	36.6	7.0
Median	34.4	6.0
Standard deviation	10.7	5.5
Min	20.0	1.0
10th percentile	24.1	3.1
90th percentile	49.2	11.0
Max	66.3	28.0
Number of observations: 36		

Note: A housing bust is defined as any period over which the price-to-income ratio falls by at least 20% and over which there is never more than a two-year period during which there is a price increase (1975-present, 21 countries listed in Table 1).

Table 3 Sources: Dallas Fed, BNP Paribas

Housing busts

A housing bust/downturn is defined as any period over which the price-to-income ratio falls by at least 20%. A bust is considered to have ended as soon as there is a two-year period over which there is a price increase. According to this definition, there were 36 housing busts in the sample considered here. Table 3 presents summary statistics.

As can be seen from the table, the median fall in the price-to-income ratio during a housing bust is 34.4% and the median duration of a housing bust is 6 years. Thus housing busts tend to be of lower magnitude but of comparable length to housing booms. South Korea experienced the largest bust in the sample according to this measure with a fall in price-to-income ratio of 66.3% between 1989 and 2001[2]. This is closely followed by the downturn in Japan which started in the third quarter of 1990 and is ongoing. The price-to-income ratio has fallen by 60% in Japan over this period. Other cases where the price-to-income ratio fell by more than 50% include Ireland between 2007 and 2013 (51.7%) and Germany between 1982 and 2010 (50.8%). The German housing downturn is also the longest in the sample at 28 years, followed by Japan (26 years). Apart from Japan, Italy and Spain are currently experiencing a housing downturn. In Italy, the price-to-income ratio has fallen by 24.5% from the peak reached in the fourth quarter of 2008 and in Spain the ratio has fallen by 34.2% from the peak reached in the first quarter of 2008.

[2] The case of South Korea is somewhat special. The price-to-income ratio has in fact been falling for most of the period since 1975 but this is mostly due to the fact that real household disposable incomes have almost quadrupled since 1975, which represents a growth rate more than twice as high as for any other country in the sample.

Household leverage

High levels of household indebtedness are another potential source of vulnerability. The reassuring fact in this context is that in most major economies, household debt as a percentage of GDP has actually been declining over recent years (Figure 4).

Fixed-rate and adjustable-rate financing

In addition to the level of debt, the source of financing may be a source of risk for housing markets in a rising interest rate environment. In particular it makes a difference whether mortgage contracts are based on fixed or adjustable rates. There are large differences in the form of financing, both across countries and over time. These international differences in the form of financing have been documented by a number of studies[3]. For example, it is well known that in the United States, mortgages are primarily fixed-rate contracts whereas in the United Kingdom they are predominantly of the adjustable-rate form. The present note uses data from the European Central Bank for countries in the euro zone. Figure 5 summarizes some of the key features of the data. For the purpose of the analysis, adjustable-rate loans include those with a floating rate or with an initial fixed rate of a period up to one year.

As can be seen from the figure, the share of fixed-rate mortgages in new production currently varies enormously across countries within the euro zone, with shares ranging from less than 10% (Finland) to close to 100% (France). It is also the case that in many countries which historically relied mostly on adjustable-rate mortgages, the share of fixed-rate mortgages in new production has risen significantly over the last five years. In Spain, Italy, Portugal and Luxembourg, this rise has been of the order of 40 percentage points and in Spain, Italy and Luxembourg fixed-rate mortgages now represent the majority of new financing. In countries like France, Germany, Belgium and the Netherlands, where fixed-rate mortgages have traditionally represented the predominant form of financing, this tendency has strengthened and fixed-rate financing now represents close to or above 90 % of new production in these countries. This tendency is presumably due to the fact that consumers have increasingly been trying to lock in historically low borrowing rates over the last few years. The one notable exception is Finland where the share of fixed-rate financing is not only extremely low but has actually been falling over recent years.

Conclusion

While housing valuations currently seem high in a number of countries, this is not a global phenomenon. In particular, valuation ratios in the three largest economies in the sample seem moderate in historical comparison. Moreover household debt has been declining in most major economies over the last five years. In the euro zone the proportion of borrowers on fixed-rate contracts has increased significantly in a number of countries over the last five years. These borrowers have effectively hedged their borrowing costs against an unexpected rise in inflation. Nevertheless higher long-term mortgage rates may weigh on housing valuations and thus create negative wealth effects for all homeowners. Borrowers on adjustable-rate contracts are in principle more exposed to a rise in borrowing costs through a rise in short-term interest rates. However this last effect would in all likelihood only be significant to the extent that short-term rates in the euro zone were to rise more rapidly than what is currently expected by the market.

[3] See e.g. Badarinza, Campbell and Ramadorai (2015) "What calls to ARMs? International Evidence on Interest Rates and the Choice of Adjustable-Rate Mortgages".

Household debt as a percentage of GDP

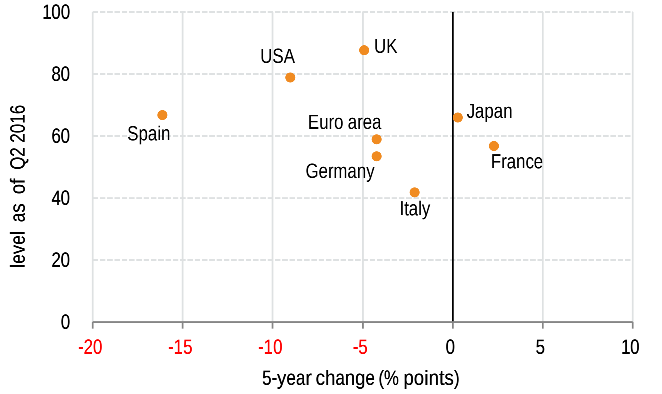

Figure 4 Sources: BIS, BNP Paribas

Fixed-rate and adjustable-rate mortgages

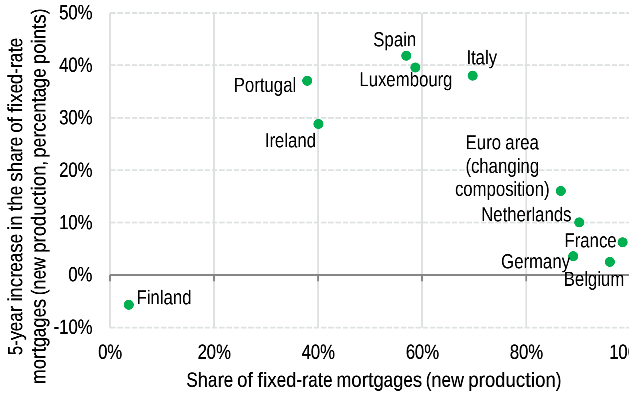

Figure 5 Sources: ECB, BNP Paribas

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