

Spotting excessive regional house price growth and what to do about it

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Executive summary

HOUSING BUBBLES are a well-known source of financial instability. In addition, given the importance of this sector to the economy, the collapse of such bubbles tends to be followed by deeper recessions and slower recoveries than other crises, as the recent boom-bust housing cycles in many countries have clearly demonstrated.

IN THE EUROPEAN UNION, the policy instruments available to address this and to prevent future housing bubbles are implemented either at the national level (macroprudential policies) or at the euro-area level (monetary policy). However, recent research suggests that house price developments and bubbles are above all a local phenomenon.

THERE ARE SIGNIFICANT REGIONAL DIFFERENCES in house price developments within EU countries, in particular between capital cities and other regions. Our results suggest that house price fluctuations in capital cities tend to be more volatile and stronger than in the rest of the countries, warranting more targeted measures at the local level.

WE PROPOSE TO use differentiated macroprudential policy at the regional level. This could be done with the application of different loan-to-value (LTV) or debt-to-income (DTI) limits for mortgages in capital cities and in the rest of the countries, in order to tighten policy more quickly in areas more prone to overheating. This type of policy has already been successfully applied in Korea. Competent authorities in the EU should consider adding this instrument to their toolkits in order to increase the precision, and therefore the effectiveness, of their policies.

THIS PAPER IS accompanied by an online annex available at: <http://bruegel.org/wp-content/uploads/2017/10/Housing-prices-City-vs-Rest-Annex-161017.pdf>

1 Introduction

Rapidly rising house prices are a well-known source of financial instability. When fuelled by credit booms¹, asset price bubbles increase the risk of a financial crisis², and the collapse of such bubbles tends to be followed by deeper recessions and slower recoveries. Debt-financed house price bubbles have emerged as a particularly dangerous phenomenon for two reasons. First, mortgages that are not repaid cause losses for the financial system. Second, households in negative equity (ie when the value of the house is lower than the outstanding mortgage) reduce their consumption significantly to rebuild their equity positions. This deepens the economic downturn (Mian, Rao and Sufi, 2013). By the same token, households increase their consumption when house prices are rising. Housing can thus be a strong pro-cyclical force in the economy, as housing boom-bust cycles in Spain and Ireland have made abundantly clear.

The cyclical pattern of house prices is very strong because households, as non-professional investors, mainly base their house price expectations on current price developments, even if these expectations look unrealistic from an *ex-post* perspective³. Such expectations have a reinforcing effect both when house prices are rising and when they are falling. More remarkably, these price expectations are mainly local: in some cities, house prices might increase, but not in others, as Shiller (2008) shows.

This Policy Contribution examines whether there are regional differences in house price growth within European countries and, if so, whether this warrants more targeted measures to address vulnerabilities⁴. The monitoring of vulnerabilities and potential imbalances in European housing markets is carried out jointly by the European Systemic Risk Board⁵ and by national authorities. Their analyses are done mainly at the country level. Though essential, tracking only national indicators means that these analyses might miss imbalances developing within countries. In Denmark, for example, the International Monetary Fund noted the growing divergence of house prices within the country and found evidence of signs of overvaluation in Copenhagen (Chen *et al*, 2016).

We focus on the division in terms of house prices between the capital cities and the rest of the territories of six EU countries for which there are sufficiently long series of house price indices (HPI) at the regional level. Capital cities are important because they tend to be large and densely populated and because they possess structural (supply-side) characteristics that can amplify the response of prices to shocks. We do not examine the drivers of property prices at the regional level, nor do we set out to identify potential bubbles, which is very difficult in real time. Instead, we calculate indicators that can be used by policymakers to gauge the level of overvaluation of residential housing separately for national capitals and the rest of the country, in order to see if there are significant divergences between the two.

A stronger cyclical pattern of property prices – coupled with slower growth of household disposable income in capital cities – would represent an additional source of financial vulnerability. This combination could lead households in capital cities to carry heavier debts (compared to their income) and thus be more vulnerable to economic shocks, with implications for financial stability if those households are not able to repay their mortgages. Moreover, price developments in the capital region might spill-over to neighbouring regions within each country, causing price changes that might be even less justified by the fundamentals of these regions.

A stronger cyclical pattern in capital cities compared to other regions within each country would indicate a clear rationale for regional-level tools. The usual instrument to dampen

1 Jordà, Schularick and Taylor (2015), in a study of bubbles in housing and equity markets in 17 countries over 140 years, showed that credit-financed bubbles are more dangerous than equity-financed bubbles.

2 The financial instability hypothesis of Minsky (1986) is based on rising asset prices financed by credit expansion.

3 As shown by, for example, Schoenmaker and Wiertz (2017).

4 The topic of regional house price differentials appears to be underexplored in the economic literature, especially when it comes to Europe (see the short literature review available in the online annex to this paper).

5 See for instance European Systemic Risk Board (2015 and 2016).

cycles is the central bank's interest rate, but its effects are felt economy-wide. Moreover, since the creation of the single currency, the euro area has one interest rate for the area as a whole, without differentiation between countries, let alone regions. That makes national and/or regional instruments to dampen financial cycles even more necessary. An instrument that could be used locally is tax. However, even though property taxes or stamp duties could be targeted regionally, adjusting taxes often to dampen house prices would be very difficult. The political decision-making and subsequent administrative implementation process is usually very slow, so that changes in the levels of the tax might even become procyclical. Structural measures to adjust the housing supply, such as relaxing planning restrictions, could also be useful to alleviate the pressure on house prices, but have typically a long lead time.

An alternative to address house-price imbalances is to use loan-to-value (LTV) and debt-to-income (DTI) limits. These borrower-based macroprudential instruments can be tightened to curb excessive house-price rises⁶. So far, their use in the European Union has only been based on the evolution of national house-price indices and applied at the national level. But regional use of these instruments might be desirable and is technically feasible, because houses are immovable and recorded in the land registry, which makes circumvention of regional policies difficult.

2 Building a European regional house price dataset

To assess the risks of regional differences in house price developments in the EU, house price index (HPI) data at the regional level for EU countries is needed⁷. Obtaining this is not easy. Most analyses focus on how house prices evolve in terms of national averages, and little attention is paid to differences in house price growth that might develop within a country. Whereas some factors influencing house prices are national (eg the availability of credit and the central bank's policy rate), housing markets are by definition tied to location and thus involve a component of supply and demand that is local in nature.

But the HPI series available for EU countries are neither standardised nor centralised in single databases. For 18 EU countries index series with some form of regional/territorial breakdown are available (Table 1)⁸. For another four countries, we found average/median prices, which unlike indices do not account for changes in the composition of properties sold and their quality (see the online annex for a detailed discussion). We collected HPI data exclusively from national statistical institutes and national central banks, which make their series publicly available. Where HPI is available from other sources, such as private-sector financial institutions (for example in the UK), we give preference to the official HPI data for consistency reasons⁹.

6 Borrower-based instruments target homebuyers who need a mortgage, but not cash buyers. Mortgage buyers are particularly vulnerable to house-price shocks, because of their outstanding mortgage. Borrower-based instruments will still have (partial) impact on house prices, as the number of buyers on the market is reduced.

7 The online annex explains why indices are used, addresses the concept of internal consistency of aggregate indices and presents the sources and properties of the data used in this paper.

8 See the online annex to this paper for details.

9 See the online annex to this paper for a comparison of sources.

Table 1: HPI availability at the regional level, EU countries

Indices			Prices	Not available
Austria	Finland	Netherlands	Belgium	Italy
Bulgaria	France	Poland	Estonia	Latvia
Croatia	Germany	Slovenia	Hungary	Luxembourg
Cyprus	Greece	Spain	Slovakia	Malta
Czech Republic	Ireland	Sweden		Portugal
Denmark	Lithuania	UK		Romania

Source: Bruegel (see online annex).

National HPI data within each EU country has been developed independently and serves national needs and possibly reflects the different structural characteristics of housing markets in different countries, making it hard to compare the indices of different countries. Regional/territorial breakdowns are thus not uniform. Consequently, we stick mainly to within-country comparisons.

We use, and where possible construct, the index with the most complete coverage for each country. Finally, time series have to be sufficiently long in order to identify patterns. We use only data from countries for which more than 20 years of data is available. This reduces our sample to six EU countries: Denmark, Finland, France, the Netherlands, Sweden and the UK¹⁰. Box 1 on page 14 provides information on Austria, Greece, Ireland and Lithuania, for which less than 20 years of data is available, and on Germany.

3 Results: are capital cities different from other regions?

The capital cities of Denmark, Finland, France, the Netherlands, Sweden and the UK are those countries' most populous urban centres, giving their associated local housing markets national importance. For Denmark, the Netherlands, Sweden and the UK, HPI series for the rest of the country excluding the capital city are not readily available but can be created¹¹, in order to show house price growth and price-to-income ratios at the regional level.

These are certainly not the only indicators used to monitor developments in the residential sector. However, apart from being directly (or indirectly) available at the regional level, these two metrics are widely-used and have a good record of performance in highlighting vulnerabilities. In his discussion of a framework for macroprudential policy, Goodhart (2011) refers to the monitoring of a set of early warning “*presumptive indicators*” including “*a rate of growth of housing (and property) prices which is significantly faster than normal and above its normal trend relationship with incomes*”. Moreover, the European Systemic Risk Board has

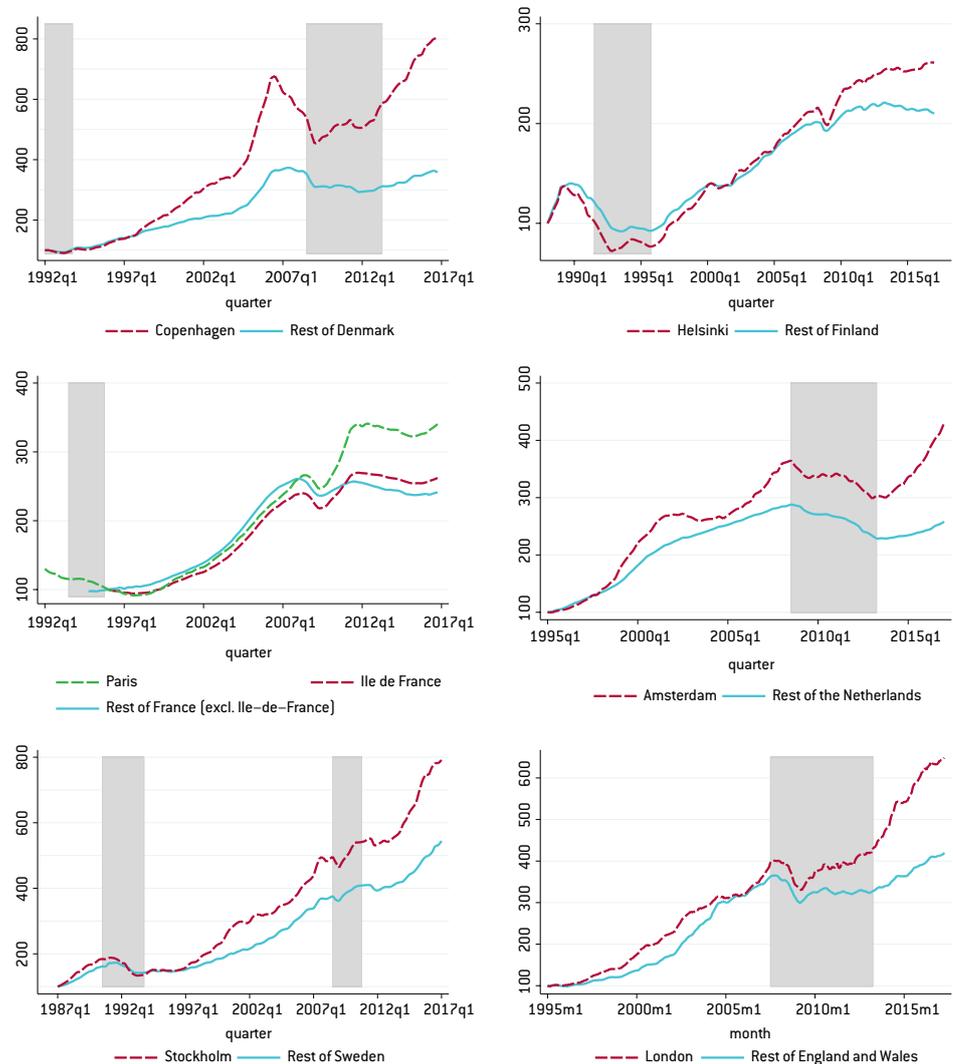
¹⁰ The data for the UK covers only England and Wales because data for Scotland and Northern Ireland is only available starting from 2004 and 2005 respectively.

¹¹ We exploit the consistency of the respective HPI and re-aggregate the constituent regional indices. The online appendix explains the method in detail.

undertaken a comprehensive study assessing the predictive capacity of a set of early-warning indicators (Ferrari, Pirovano and Cornacchia, 2015). In an EU-wide setting, nominal house price growth and price-to-income gaps were ranked among the most reliable early-warning indicators of unsustainable bubbles.

Figure 1 compares **house price developments** in the capitals and the rest of the territory in the six countries of our sample, relative to house prices at the start of the period in each case. Because the HPI data tracks house price growth (not absolute price levels) relative to a certain point in time, it follows that it is important to know the conditions prevailing at the start point in order to understand the influence of base effects. The shaded areas in Figure 1 show periods of housing crises (using the dating convention from Ferrari, Pirovano and Cornacchia, 2015). In the early 1990s, when most of the series began, all of the countries of our sample with the exception of the Netherlands went through housing crises, meaning the series start in the trough of the cycle¹².

Figure 1: House price indices, beginning of period = 100

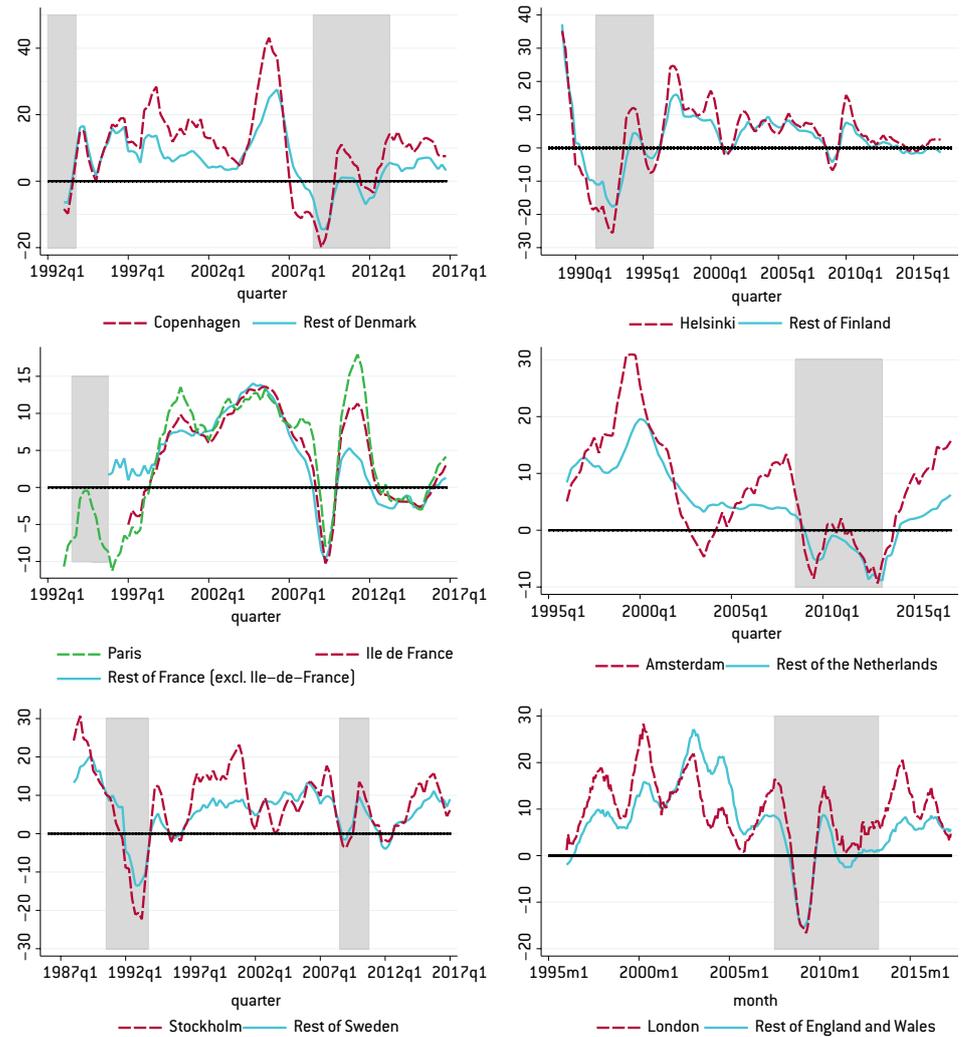


Source: Bruegel (see the online annex). Note: The shaded areas represent periods of real estate-related banking crisis, based on a table from Ferrari *et al* (2015). For France, we included the series for Paris (apartments only) for illustration purposes.

¹² In the UK, the crisis lasted from the third quarter of 1990 to the second quarter of 1994, ie it ended two quarters before the start of the series. The starts of the crises in Denmark and France are not contained in the chart: they began in the first quarter of 1987 and the third quarter of 1993 respectively.

Figure 2 shows **year-on-year HPI growth rates** while Table 2 lists some of the descriptive statistics of the HPI growth rates. Higher average price growth in capitals over the longer run suggests that the price differential has structural features, such as persistently higher demand and less-responsive housing supply caused by restricted land supply and/or stricter planning rules in capitals. Interestingly, house prices in capitals also seem to have a stronger cyclical component, with higher upturns and deeper downturns. This stronger cyclical pattern is confirmed by more volatile year-on-year growth rates in capital cities, with the exception of London. As can be seen in Table 2, standard deviations and max/min of the price growth in one year are clearly higher in capital cities than in the rest of the countries.

Figure 2: HPI year-on-year growth rates (%)



Source: Bruegel. Note: See Figure 1.

Table 2: House prices, descriptive statistics, year-on-year changes (%)

	Average year-on-year growth rate	Standard deviation	Min of year-on-year growth rate	Max of year-on-year growth rate
Denmark				
Copenhagen	9.78	12.10	-19.89	43.13
Rest of Denmark	5.86	8.09	-14.47	27.64
Finland				
Helsinki	3.62	10.33	-25.61	35.22
Rest of Finland	2.57	7.84	-17.78	37.17
France				
Paris	3.70	7.63	-11.26	17.97
Ile de France	4.53	6.04	-10.25	13.65
Rest of France	3.96	5.59	-9.85	14.06
Netherlands				
Amsterdam	7.17	9.38	-9.34	30.96
Rest of the Netherlands	4.53	6.72	-8.88	19.61
Sweden				
Stockholm	7.45	9.47	-22.32	30.67
Rest of Sweden	5.91	6.29	-13.63	20.23
United Kingdom				
London	9.34	7.84	-16.66	28.34
Rest of England and Wales	7.14	7.96	-15.35	27.15

Source: Bruegel.

Table 3 shows compound annual growth rates in house prices for the capital city and the rest of the country for each country in our sample. Use of compound annual growth rates enables us to better compare trends during two separate periods – before and after the most recent downturns in each country. The price growth differential between the capitals and the other parts of each country ranges from 0.6 to 3.5 percentage points. Overall, there is evidence that property price growth in each capital is persistently higher than in the rest of the country.

Another striking feature of the data is the different responses of house prices after the most recent downturn. Table 3 also shows the compound annual growth rates in the periods before and after the most recent trough, which, except for Denmark, coincide for the capital and the rest of the country in each of our sample countries. Within-country differences in growth rates have widened in the latest phase of rising house prices, mainly as a result of price growth outside the capitals remaining below its previous average. In fact, the price level when excluding the capital city is lower than the previous peak in all countries except Sweden and the UK (England and Wales). On the other hand, price rises in capital cities have been relatively constant in the two sub-periods. Two exceptions stand out: in Amsterdam, price rises after prices bottomed in 2013 have outpaced the historical norm, while in Ile de France, prices have been slower to rise since 2009. Low mortgage interest rates, as a result of the central banks' accommodative monetary policies might also have contributed to recent rising house prices in several capital cities.

Table 3: HPI, compound annual growth rates

		Compound annual growth rates			Dates		
		Whole period	Before last trough	After last trough	Whole period: start	Whole period: end	Last trough
DK	Copenhagen	8.8	9.3	7.7	1992q1	2016q4	2009q1
	Rest of Denmark	5.3	5.6	4.3	1992q1	2016q4	2011q4
FI	Helsinki	3.4	3.3	3.1	1988q1	2017q1	2009q1
	Rest of Finland	2.6	3.2	0.9	1988q1	2017q1	2009q1
FR	Paris	5.2	5.6	4.5	1994q4	2016q4	2009q2
	Rest of France	4.2	6.3	0.3	1994q4	2016q4	2009q2
NL	Amsterdam	6.9	6.3	9.8	1995q1	2017q1	2013q1
	Rest of the Netherlands	4.4	4.6	3.4	1995q1	2017q1	2013q2
SE	Stockholm	7.1	7.4	6.5	1987q1	2017q1	2010q4
	Rest of Sweden	5.8	6.1	4.9	1987q1	2017q1	2010q4
UK	London	8.8	8.7	8.7	1995m1	2017m4	2009m4
	Rest of England and Wales	6.7	8.0	4.2	1995m1	2017m4	2009m3

Source: Bruegel. Note: The method for selecting peaks and troughs is based on an algorithm developed by Harding and Pagan (2002) to define business cycles. The user must choose a rule: the shortest possible length for a cycle (time between two peaks) and for a phase (time between a peak and a trough). The algorithm then selects those peaks and troughs that respect the rule. We apply it to HPI levels and set the rule at 12 quarters for the length of the cycle and 3 quarters for the phase. The reason is that periods of declining prices (contraction phases) are generally much shorter than periods of rising prices (expansion phases). The algorithm does not identify recent troughs for Sweden so we consider the end date of the real estate-related crisis as it appears in Ferrari *et al* (2015). We also ignore the last trough that the algorithm identifies for France, because it appears to be spurious.

Price growth in capital cities thus generally tends to be more volatile and more pronounced compared to the rest of the country in each case¹³. Meanwhile current price rises outside the capitals in each country remain subdued compared to the average over previous cycles. These different developments point to the need for a differentiated approach when it comes to the residential property markets in large cities and in the rest of each country (with greater vigilance needed for the former). Rapidly increasing property prices can be a sign of overheating in the housing market and raise the possibility of a housing bubble forming. At the heart of these risks is a misalignment between prevailing market prices and the value of residential housing assets justified by economic fundamentals. We look at price-to-income ratios (house prices relative to household disposable income) to assess the affordability of housing in our sample countries. The price-to-income ratio has the advantage of being calculable at the regional level.

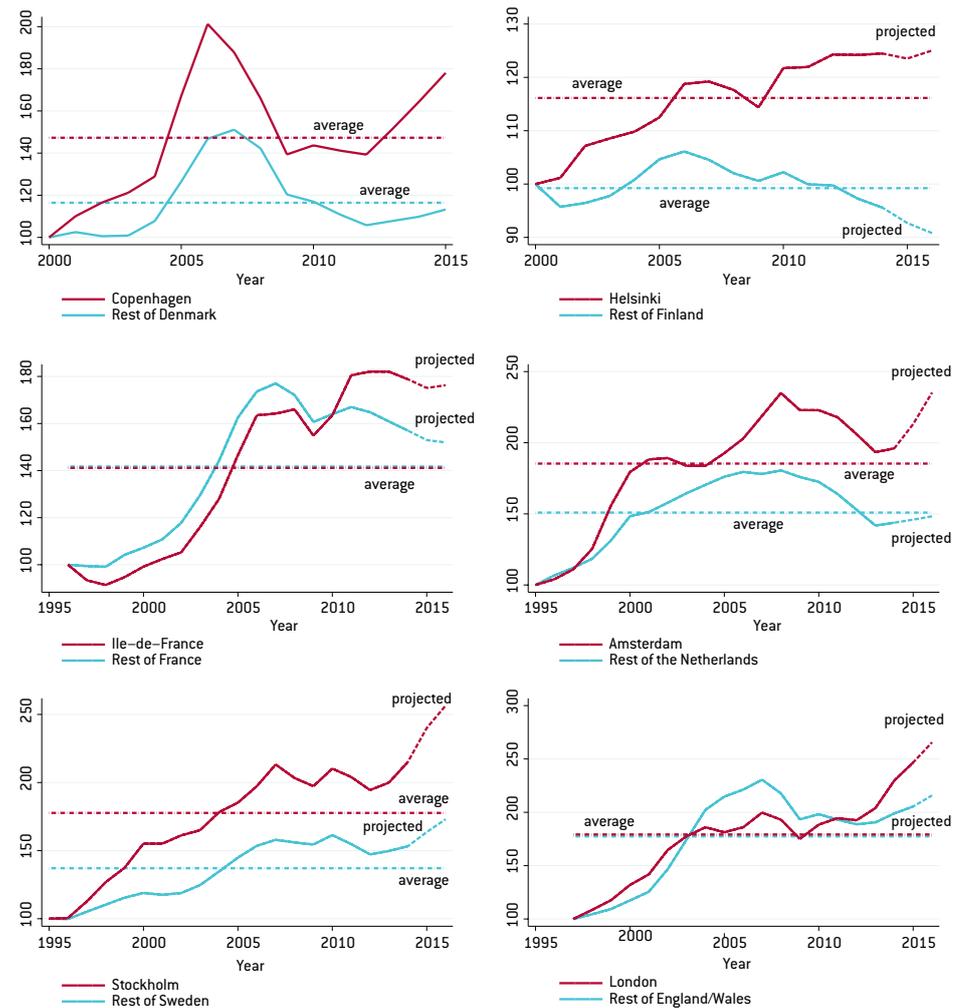
A rising price-to-income ratio indicates less affordable housing, with residential property prices growing faster than the disposable income of households. Unfortunately, as household disposable income is taken from annual regional accounts, data is published only after a delay and the most recent data available is from 2015 or before. Since the within-country spread in property price growth has increased substantially in the last couple of years, ie after the latest available data point for disposable income in some cases, we extend the disposable income series to 2016, based on the corresponding national figures from the national

¹³ We present the Ile-de-France series instead of the Paris series because the series for Paris is only for apartments (there is no series for houses) and can therefore not be compared to the rest of France. Nevertheless, the two series are very similar.

accounts, which are published more quickly than the regional data (see notes to Figure 3).

Figure 3 shows price-to-income ratios for the national capital and the rest of each country normalised to 100 at the start of the series. Over time, ratios have generally increased, implying that housing is becoming less affordable for the average household. Longer-term averages could act as a benchmark against which we could compare recent developments or measure a price-to-income gap. However, in most cases here the ratios are not stationary, making averages less useful. The upward trend of the ratios is explained by the fact that real estate-related financial crises took place at the beginning of the 1990s in most of the countries in our sample. The series for Denmark and Finland begin in 2000, resulting in relatively more stable price-to-income ratios when capital cities are excluded.

Figure 3: Price-to-income ratios, beginning of period = 100



Source: Bruegel. Note: Price-to-income ratios are obtained by dividing the HPI series by the household sector's disposable income per capita from regional accounts and normalised to 100 at the beginning of the sample period (1995, except for 2000 for Denmark and Finland). Growth rates of regional disposable income beyond the last data point are predictions of a linear regression of growth rates on national disposable income from national accounts and a constant. Projections extend to 2016 except for Denmark, where the annual HPI series stops in 2015. Disposable income data is not available at the municipal level for Amsterdam or for Greater Helsinki; growth rates for the region of North Holland and the sub-region of Helsinki are used instead. Depending on the availability, gross (DK, FR, UK) or net (FI, NL, SE) disposable income (of consumption of fixed capital) was used but the intra-country comparisons stick to the same definition of disposable income. See the online annex.

In Figure 3, the effect of the global financial crisis is visible at the end of the 2000s and though its intensity varies by country, it is clear that before the crisis, price-to-income ratios

were increasing in all of the countries in our sample. Moreover, relative differences in affordability between regions were present but were not extreme. In relative terms, in Denmark, Finland, the Netherlands and Sweden, housing in the capital was becoming less affordable compared to the rest of the country before the crisis, whereas in France and the UK the opposite was the case. However, during the global financial crisis and its aftermath, price-to-income ratios in the rest of the country in each case stalled or fell, while in capital cities they continued increasing either modestly (Helsinki, Ile-de-France) or sharply.

As with price growth, recent developments in price-to-income ratios point to growing divergences and strong growth in capital cities. Affordability has decreased in capital cities with the ratio for capital cities at or above its historical peak in all our sample countries. This contrasts with relatively stable price-to-income ratios in areas outside the capitals in recent years. However, in some countries price-to-income ratios are also rising outside the capital, pointing to the need for vigilance at the national level as well. In Sweden, for example, the ratio for the country outside Stockholm reached in 2016 its maximum value in the last two decades. The price-to-income ratio was also approaching past peaks in England and Wales outside London. But even in these two cases, there is evidence of a decoupling between capitals and the rest of the country.

Persistently decreasing affordability in capital cities is relevant for financial stability, to the extent that it could lead households in capitals to become excessively leveraged, thereby bringing into question their ability to service their debts in case of shocks (such as changes in interest rates or income levels). These diverging trends in affordability between parts of countries calls for a differentiated approach in instruments. We consider this possibility in the remainder of this paper.

4 Policy options and concluding remarks

Capital cities are different. It is clear that their more rapidly rising house prices are partly related to structural factors. These include faster population growth than areas outside the capitals, which is related to movement of labour from the provincial areas to the main cities and migration (migrants tend to concentrate in the most-populated urban areas). These movements might be spurred by the rise of new services and digital companies. These firms typically base themselves in larger cities (with good airport connections and good 'lifestyle' facilities), whereas industrial companies are typically more spread out over the country. Combined with a shortage of new homes in the capital cities, the extra demand leads to price rises if the supply is not elastic, which is often the case in capital cities which are already densely built-up and where planning restrictions are often stricter than in the countryside. Some of these restrictions could be relaxed to reduce the supply constraint, but, as our results show, house prices in capitals are also more volatile than in other areas. Structural measures by themselves might not be enough to moderate house price cycles in capital cities. Macroprudential measures appear to be more adequate to tackle the cyclical nature of the problem. However, are policies based on national house price indices appropriate for dealing with the specific overly-cyclical pattern of capital cities?

In November 2016, the European Systemic Risk Board issued warnings to five of the six countries in our sample (France was the exception) and to an additional three (Austria, Belgium and Luxembourg) on the basis of systemic risks stemming from their residential real estate sectors in the medium term. The sources of the vulnerabilities in these five cases were the combination of high household indebtedness and potentially risky price dynamics. Concern about rapidly growing and overvalued prices was voiced in particular for Sweden, Denmark and the UK. The analyses underlying these warnings highlighted the divergence in prices between parts of each country, for instance in Denmark. The European

Commission, the International Monetary Fund and the Organisation for Economic Cooperation and Development have raised similar points.

In addition, the ESRB analyses did not identify risks stemming directly from lenders' balance sheets. EU-level safeguards (from the Capital Requirements Regulation and Directive), both in general and specifically in relation to residential real estate (sectoral capital requirements and risk-weights, limits on losses in cases of default) appear to have made banks' balance sheets more resilient. Although borrower-based (DTI/loan-to-income/debt-service-to-income ratios, amortisation) and collateral-based (LTV) macroprudential instruments, which are mainly left to national law, have been implemented or announced in the aforementioned countries, the ESRB considered them inadequately used in light of the risks. Section 4.1, briefly describes the current frameworks in which such macroprudential measures are applied in the countries analysed in section 3.

4.1 Country experiences

In the **Netherlands**, the maximum LTV in 2010 was 112 percent. It has been undergoing a gradual reduction to 100 percent by 2018. The Dutch Financial Stability Committee has advised future governments to continue the gradual lowering of the LTV limit for mortgage loans after 2018 towards 90 percent, by reducing it by one percentage point per year. With house prices rising by six percent per year across the Netherlands, this advice appears sensible and there is no reason for macroprudential policies to intervene more forcefully. However, high price rises of 15 percent per year in Amsterdam might justify further macroprudential action to take the heat out of that particular market. Notwithstanding the heating up of the Dutch housing market and the advice to lower the LTV limit, the incoming Dutch government has the intention to keep the LTV limit at 100 percent across the Netherlands.

Private home-owners in **Denmark** are required to make a down-payment of at least five percent when taking out a loan. Moreover, owing to the within-country divergence in house prices, the Danish Financial Supervisory Authority (Finanstilsynet) has seven best practice guidelines, to apply only in areas with high price levels and increases. In March 2017, the Danish Systemic Risk Council recommended a cap on the flow of new mortgages (15 percent) to borrowers with high debt-to-income (DTI) ratios (400 percent or greater) in high-price areas, which include the city of Copenhagen and its environs, and the city of Aarhus. The government has called on banks to follow the Council's recommendations.

An 85 percent LTV limit was introduced in **Sweden** in 2010. In 2016, the Swedish financial services authority (Finansinspektionen) decided to impose amortisation requirements on new collateralised lending to highly leveraged borrowers (LTV exceeding 50 percent). Specifically, mortgages with an LTV ratio of more than 70 percent must be amortised at an annual rate of at least two percent of the original amount, with that rate falling to one percent when the LTV is between 50 percent and 70 percent. This measure was initially slated to be put in place in 2015 but its implementation was halted because of doubts about the compatibility of such measures with the Finansinspektionen's mandate. Finally, in May 2017, the Finansinspektionen announced its proposal to tighten further amortisation requirements by an additional one percent annually if DTI ratios exceed 450 percent.

In **Finland**, a maximum LTV ratio was introduced in 2016 at 90 percent, with 95 percent for first-time buyers. The financial services authority (Finanssivalvonta) may reduce the limit by 10 percent if tightening is deemed appropriate.

In the **UK**, a cap on the quarterly flow of new lending (15 percent of the number of loans) to borrowers with high DTIs (above 450 percent), similar to that in Denmark, is in effect. The Bank of England Financial Policy Committee also requires lenders to apply an interest rate stress test before granting a mortgage. The test assesses whether borrowers can still afford the mortgage if the interest rate increases by three percent anytime in the first five years of the loan.

France has no borrower-based or collateral-based macroprudential measures in place. However, although there is no official limit, in practice French credit institutions have all adopted a standard whereby all repayments of housing loans (including interest rates pay-

ments) must not exceed one-third of the borrower's gross income (Haut Conseil de Stabilité Financière, 2017).

4.2 Policy options

All the policies described in section 4.1 (except in Denmark) are implemented at the national level and do not take into account divergences between capital cities and the rest of the countries in our sample. National policies, based on average house price growth, can be too blunt to dampen excessive house price growth in capital cities, and too tight for the rest of the country where house price growth is subdued. This could be tackled through taxes or structural measures, but these would require a long lead-time and would play out over the long term. Instead, a differentiated macroprudential policy could be implemented through different LTV or DTI ratios for mortgages in capital cities and in the rest of the countries. But where and when should these measures be applied?

Where to differentiate

The first step would be to determine whether there are significant differences between capital cities and the rest of a country. If this were the case, a differentiated approach would be warranted.

One country that already does this is Korea, which 15 years ago put in place a differentiated application of LTV and DTI ratios according to zip-codes, in order to tighten policy more quickly in areas more prone to overheating. In areas considered 'bubble-prone', the Korean Financial Services Commission implements tighter LTV ratios, regardless of types of housing, or the amount and maturity of new mortgages. LTV ratios are relaxed for first-time buyers and low-income households (Financial Services Commission, 2017).

An area is designated as a 'speculative zone' where special measures might be required if both the following two criteria are satisfied (Igan and Kang, 2011):

- The monthly HPI rose more by than 1.3 times the nationwide CPI inflation rate during the previous month;
- Either (i) the average house price growth rate in the previous two months was more than 1.3 times the average national rate in the previous two months, or (ii) the average of the month-on-month house price growth rates over the previous year was higher than the average of the month-on-month national rate over the previous three years.

Since 2002, the Korean authorities have imposed tighter limits on LTV and DTI ratios in specific areas on several occasions, and have succeeded in taming local house price booms, in terms of both prices and number of transactions (Igan and Kang, 2011).

A similar framework could be applied in EU countries to prevent overheating of local housing markets and its consequences. Applying the criteria used in Korea to the six countries in our sample shows that the capital city in each case would qualify as a 'speculative zone' most of the time, especially in periods of rising prices. Figure 4 shows the periods (shaded grey) during which the criteria used in Korea would have been fulfilled and capital cities would have been considered 'speculative zones'.

When to differentiate

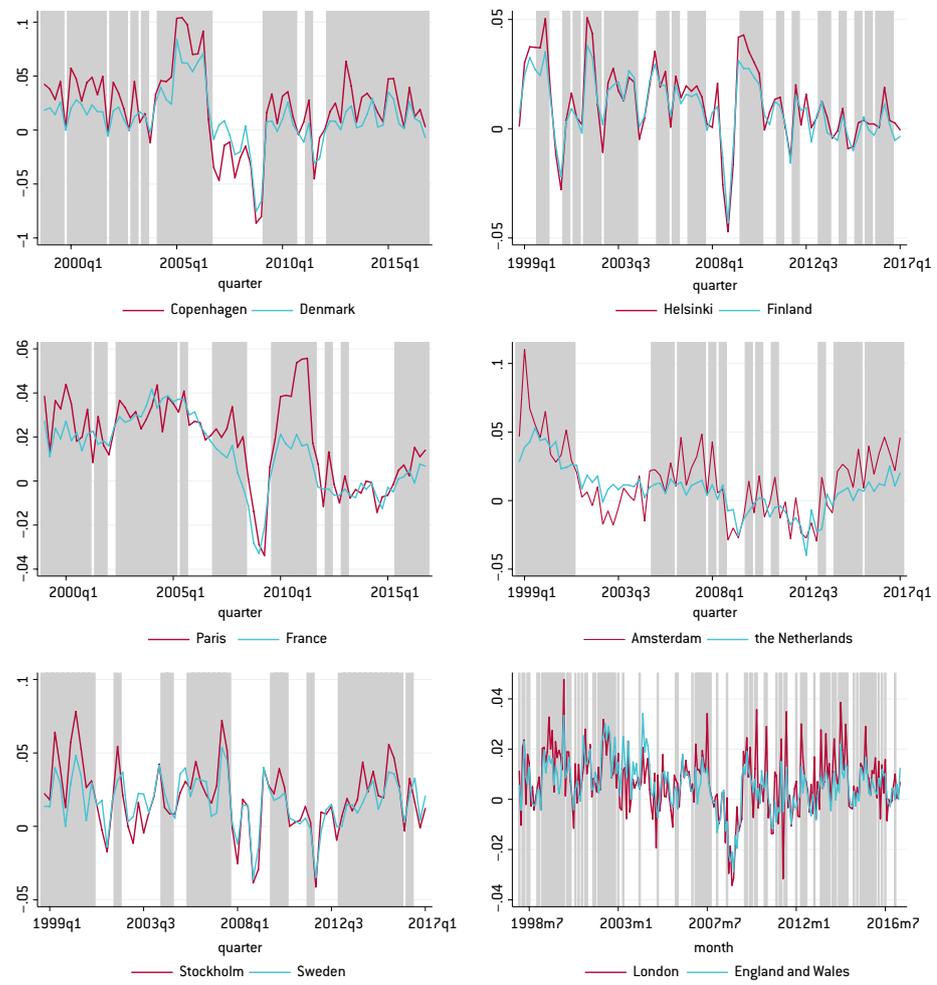
With these criteria in place, the second step would be to monitor house prices at the regional level to decide when to tighten or to loosen the policies. When house price growth is considered to be excessive in a particular region, the responsible authority would impose measures or explain why measures are not taken¹⁴.

However, it is difficult to set a specific house price growth trigger point beyond which

¹⁴ The 'comply or explain' strategy was also advocated by Ingves (2017) endorsing a view previously formulated by Charles Goodhart (2011).

action might be taken, in contrast to consumer price index inflation in monetary policy (Ingves, 2017). For the responsible authority, it is hard to know what constitutes the correct price growth rate at a given time, because house prices are determined by a range of different factors that are both cyclical and structural in nature. Indicators are therefore necessary to know when to take action, as house prices are very important for financial stability.

Figure 4: Designation of 'speculative areas', six EU countries



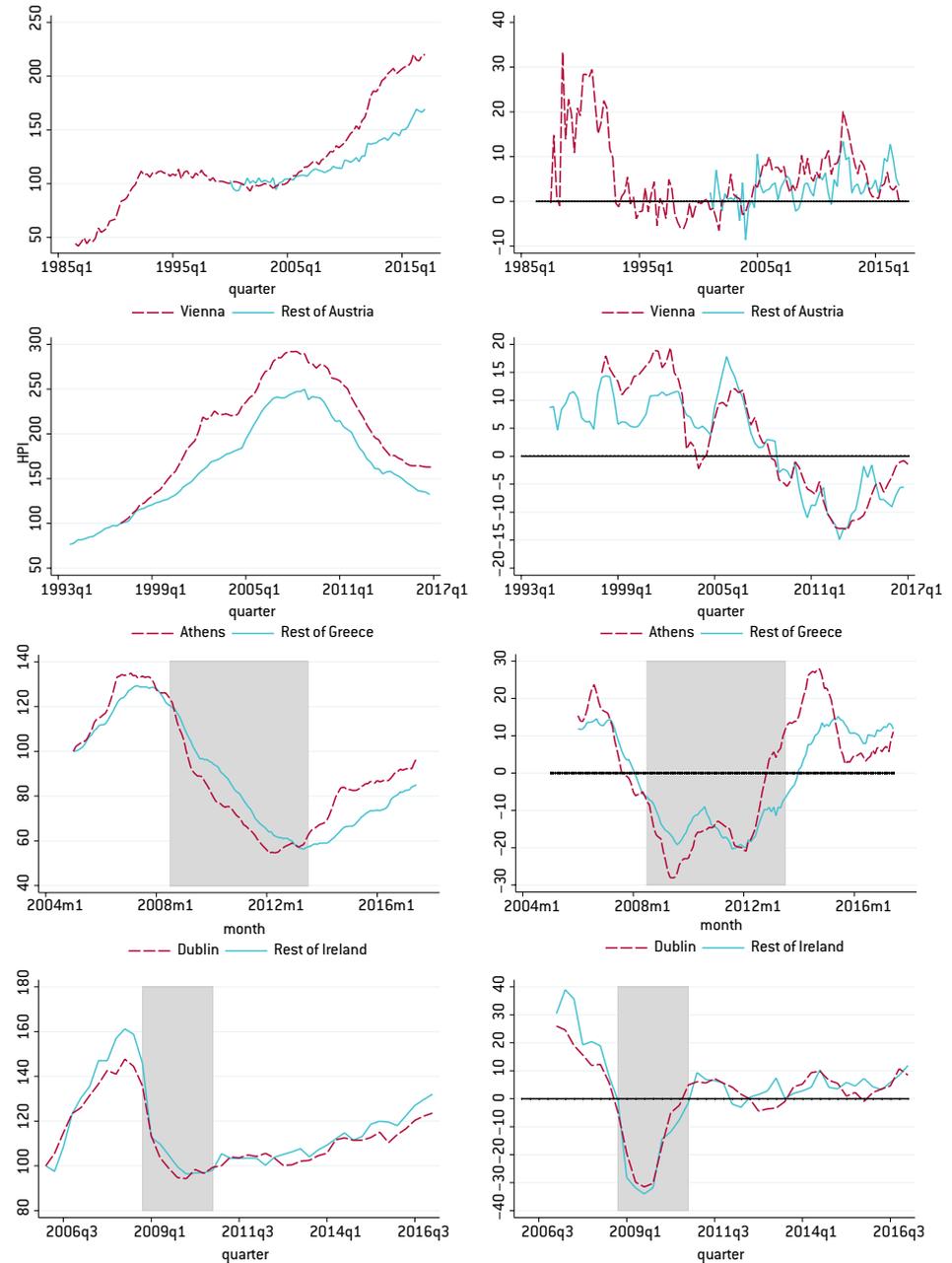
Source: Bruegel. Note: Shaded areas indicate the periods during which capital cities in the sample countries would be designated 'speculative areas' based on the criteria used in Korea. The criteria have been adjusted to accommodate the quarterly frequency of the HPI series (except for London and England/Wales where the frequency is monthly, as in Korea).

Appropriate ranges for the indicator can be established precisely using historical data. As a starting point, we suggest that the five to 10 percent annual house price growth range would warrant close monitoring, with potential for action if deemed appropriate. The 10 percent or more range would set off a 'comply or explain' regime: 'comply' meaning macroprudential measures at the regional level would be tightened, and 'explain' meaning provision of a justification for the lack of measures. The macroprudential authority can publish the indicators and the measures (or the lack of them) in its semi-annual financial stability report. Tightening of macroprudential policies can be done through lowering LTV and/or DTI limits. In that way, the housing boom-bust cycle might be dampened.

Box 1: HPI in other countries

While at least twenty years of regional house price data is available for the six countries of our sample, ten years of regional data is available for another four EU countries (Figure 5).

Figure 5: HPI, index levels (left panels) and annual growth rates (right panels) in Austria, Greece, Ireland and Lithuania



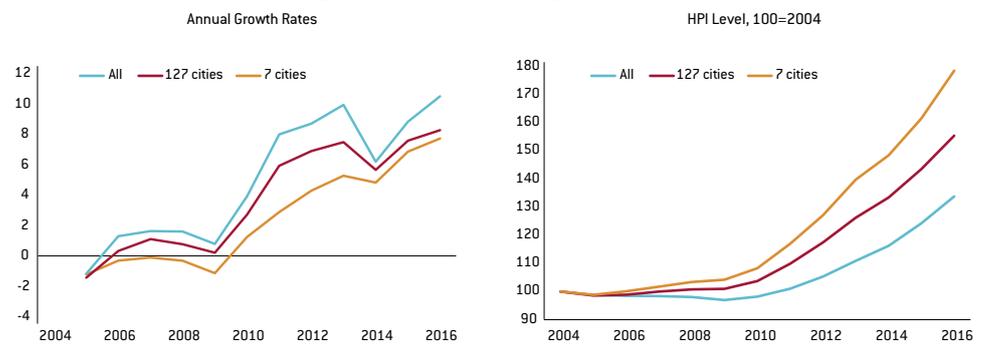
Source: Bruegel. Note: The HPI for Greece is limited to apartments and the 'rest of Greece' to urban areas other than Athens. The shaded areas represent periods of real estate-related banking crisis (see note to Figure 1).

For the largest EU economy, Germany, detailed house price data at the regional level is not readily available. The Bundesbank publishes an HPI broken down in terms of geography into: seven large cities (Berlin, Cologne, Dusseldorf, Frankfurt (Main), Hamburg, Munich and Stuttgart), 127 cities (the seven large cities plus another 120 cities) and the national aggregate. Figure 6

plots the index levels and growth rates for the three geographical aggregates. Overall, strong house price growth since 2009 is evident in Germany; house prices rose at an accelerating pace between 2009 and 2013 and continued to grow at a constant but high rate until 2016. Throughout this period, house prices in the large cities rose faster than in the rest of the country.

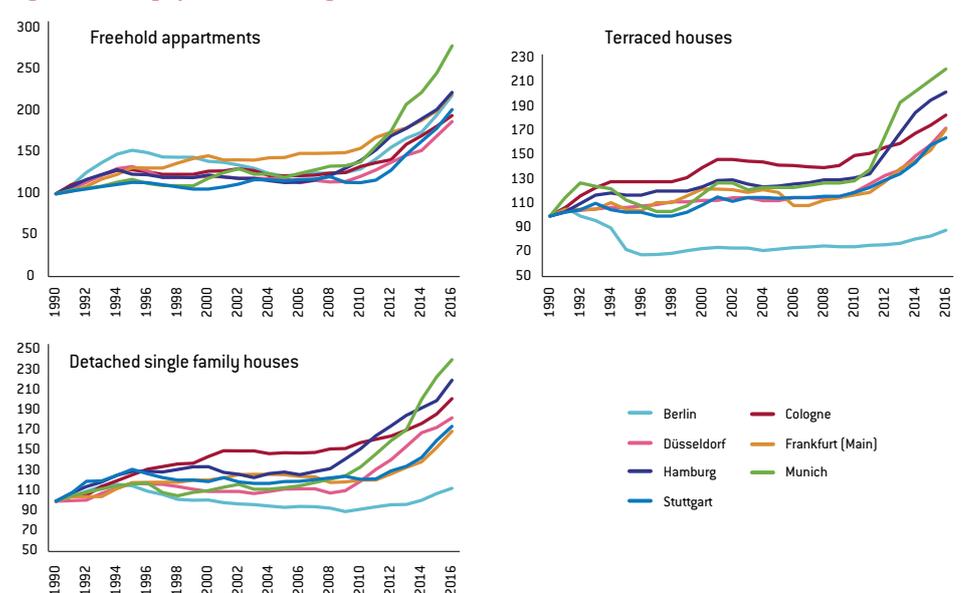
Though the Bundesbank does not publish indices for individual cities, the average prices of properties sold in each of the seven large cities from the underlying price micro dataset give an indication of differences in growth rates in those cities. Figure 7 shows that house prices in German cities have evolved in a similar way in the last three decades. Nevertheless, the recent acceleration was stronger in Munich, Hamburg and Berlin (in the case of freehold apartments) compared to other cities. In Berlin, detached single-family houses have appreciated little if at all since 1990. Moreover, before 2009, apartment prices in Frankfurt and house prices in Cologne increased faster than in the other cities. The Bundesbank estimated that in 2016, houses in German cities and towns were overvalued by 15 percent to 30 percent, with the apartments in the largest cities being the most overvalued (Deutsche Bundesbank, 2017).

Figure 6: HPI (levels and annual growth rates) in Germany



Source: Bruegel. Note: 2004=100. Seven cities= Berlin, Cologne, Dusseldorf, Frankfurt, Hamburg, Munich and Stuttgart.

Figure 7: Average price, seven large German cities (1990=100)



Source: Bruegel based on Bulwiengesa AG. Notes: 1990 = 100. The figures do not show HPI values but the average price of properties (by type) sold in each of the seven cities. As such, this measure of aggregate prices is not quality adjusted (the Bundesbank uses the method of 'typical cases' to adjust for quality changes, which requires information at the property level not available to us). The weights used to aggregate different property types into the HPI are not publically available. The only aggregation of average price we carry out is between new and existing (resold) properties (for freehold apartments and terraced houses) using the Bundesbank HPI weights, which in turn are the weights used in the Destatis HPI (weights over 2008-10; BuBa HPI uses 2010-12 but is not available).

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