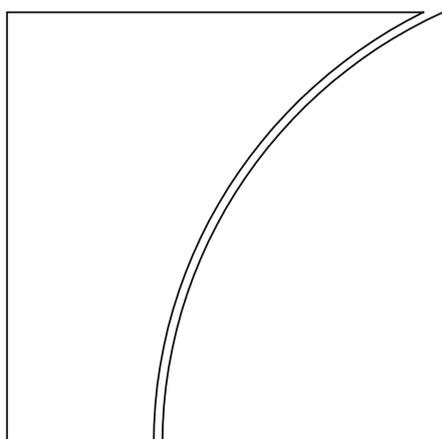Irving Fisher Committee
on Central Bank Statistics

IFC Report

Mind the data gap:
commercial property
prices for policy

March 2019

BANK FOR INTERNATIONAL SETTLEMENTS

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This publication is available on the BIS website (www.bis.org).

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[2]   This report draws extensively on the proceedings of the International Workshop on Commercial
       Property Price Indices (CPPIs), organised by the Central Bank of the Republic of Turkey (CBRT) in
       Cappadocia on 7–8 May 2018 (see Workshop on Commercial Property Price Indices).

Mind the data gap: commercial property prices for policy[3]

Executive summary

The monitoring of real estate markets has become an essential part of the policymaker's analytical framework, including that of central banks as well as macro- and microprudential supervisors. One key factor is that developments in both commercial and residential properties can significantly contribute to **financial sector procyclicality** with potentially severe implications for the real economy. In this context, the Data Gaps Initiative (DGI) endorsed by the G20 has been instrumental in recognising the usefulness of commercial property price indicators (CPPIs) for policy, especially in addressing the various financial stability issues highlighted during the 2007–09 Great Financial Crisis (GFC).

A number of **sources can potentially be used** to measure commercial property price developments. First and preferred are transaction records (official selling prices registered by land registries or tax authorities), although these are not always available. A second, often complementary, source is appraisals or valuations (estimated prices based on expert judgment, taking into account the general market situation, the characteristics of the property and its location). Finally, financial market indicators (for instance, the prices of funds investing mainly or solely in commercial property, such as real estate investment trusts (REITs)) can provide an indirect source, with good timeliness but limited coverage.

It is widely recognised that there is **no single best source** for the compilation of CPPIs. Moreover, and despite their relevance, CPPIs are scarce and not comparable between countries. Transactions are few in number and unrepresentative of the full stock of properties, especially during recessions, while market segments are heterogeneous. In addition, transaction records often lack information on the quantitative and qualitative characteristics of the underlying property, such as its size and major renovation work. Turning to appraisal-based data, these can certainly help to fill information gaps, but they also have drawbacks: valuations are carried out infrequently and may have a subjective element; and samples may be biased in terms of market segments (eg high-value properties). Lastly, financial market sources can provide almost real-time information, a key advantage over transaction and appraisal-based CPPIs, which run the risk of being lagged and of smoothing underlying developments. But, in many countries, the related markets appear to be too small, illiquid and unrepresentative of the overall commercial property sector.

As a result, CPPIs are **published only in a handful of places**. Moreover, while the aim should be to produce timely information on the value of property stocks, quality-adjusted price indices and associated structural indicators on commercial property markets, and with a quarterly frequency, few of the currently published indicators meet these objectives. In several countries, the infrequency of transactions

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[3] This report draws extensively on the proceedings of the International Workshop on Commercial Property Price Indices (CPPIs), organised by the Central Bank of the Republic of Turkey (CBRT) in Cappadocia on 7–8 May 2018 (see Workshop on Commercial Property Price Indices).

and the heterogeneity of commercial properties have prevented the compilation of official, transaction-based and quality-adjusted statistics. In some cases, private commercial providers instead compile appraisal-based data sets, but these are often not available to the public. Furthermore, the lack of international compilation guidelines has so far hampered cross-country comparability.

Important progress is nevertheless being made, thanks to national and international efforts. For instance, the ECB calculates and publishes an experimental CPPI for the euro area as a whole and for several European Union (EU) countries by combining official national data with information from private sector data sets. Meanwhile, the Bank for International Settlements (BIS) collects and republishes CPPIs from its member central banks on a best-efforts basis.

The **way forward** should be both pragmatic and ambitious. Pragmatic, by using all the information available to make progress; for instance, the combination of transaction valuations, appraisals and REITs data has proved to be a worthwhile option in some countries. In addition, national efforts are bearing fruit. When the BIS started to publish CPPIs back in 2010, the data set covered only four countries. Since then, coverage has expanded, to 16 countries at present, and will continue to do so. Ambitious, because there is a need for internationally agreed definitions, methods and classifications if CPPIs are to be compiled that are consistent at the global level. Further discussions, research and exchanges on national experiences are clearly needed to develop such comprehensive guidance.

1. Increased policy interest in information on commercial property prices

Background

Measuring and analysing CPPIs has become increasingly topical for those in charge of **monitoring economic and financial developments**. This reflects several factors. First, commercial property is a key factor in economic production, and the building of factories, offices, stores etc requires significant resources. Moreover, deciding to invest in a property is often a strategic decision, with long-term consequences in terms of revenues, activities and performance. Furthermore, property is an asset whose value directly impacts its owner's financial position: higher prices tend to flatter the balance sheets of property owners – for an introduction to such wealth effects and their measurement in the financial accounts framework, see, for instance, van de Ven and Fano (2017).

From a **financial stability perspective**, prices for tangible assets such as commercial property can play a major role in driving booms and busts in the financial cycle – which are characterised by a much greater amplitude and length compared to the more traditional business cycle (BIS (2015a)). The upward phase of this financial cycle is typically triggered by favourable financial conditions, leading to an expansion in credit and asset prices and to an underlying erosion in balance sheet quality. The process can quickly go into reverse once overly optimistic perceptions are adjusted, triggering a general economic deleveraging and sharp corrections in asset prices. A key element behind these mechanisms is the "procyclicality" of the financial system (Crockett (2000)). In particular, higher asset prices boost the value of assets that can

be used as collateral to borrow; the "financial accelerator" mechanism supports debt-financed spending and, in turn, asset prices in a self-reinforcing way (Davis and Zhu (2005), Tissot (2014)).

Such **forces can be particularly destabilising** in the case of commercial property: rising prices typically tend to flatter corporate balance sheets, with higher net worth supporting additional borrowing capacity. This encourages banks to provide additional funding against (increasingly valuable) collateral, further relaxing firms' credit constraints. Past experience also shows that this is often associated with excessive tolerance for risk-taking, an inappropriate relaxation of lending standards and a tendency to provide credit with insufficient consideration of the sustainability of the projects financed (Borio et al (2001)). At some point, funding can quickly dry up and prices may adjust markedly, leading to rising bank provisions against commercial property loans (David (1993)). One key reason is that tangible assets can rapidly become obsolete once they fall out of use. For example, factory buildings or shopping malls typically see a rapid decline in their market values if they are closed, even temporarily, and usually require significant resources to be reopened. These potentially large depreciation effects represent a notable difference compared with other types of asset, including of course non-tangible assets but also houses. Household demand for accommodation tends to be relatively more stable, as a residential property will typically preserve a certain underlying value because it serves as housing even in "bad times" (eg for its owner-occupiers).

In this light, information on the value of commercial properties can be an important input for economic and financial analysis, especially in **support of policymaking in the financial stability area**. The BIS was early to emphasise the usefulness of including such information in analytical frameworks. BIS work on cross-country house price data dates back to the late 1980s (BIS (1989)), and subsequent research conducted in the early 1990s highlighted the importance of considering aggregate asset prices when exploring the link between money and credit and the real economy (Borio et al (1994)). It also pointed to the specific role played by commercial property, as a distinct input to be considered in addition to residential property and equity shares when analysing the impact of asset prices on the economy and the financial system.

Yet, most of the analytical work conducted on these issues in the years preceding the GFC was limited to Residential Property Price Indicators (RPPIs) (BIS (2005)), reflecting a general lack of information on commercial property. For instance, research on the determinants of property prices (eg Tsatsaronis and Zhu (2004), Égert and Mihaljek (2007)), on the link between property prices and credit (eg Davis and Zhu (2005)) and on the information content of real estate prices (eg Borio and Drehmann (2009)) focused mainly on residential properties. In contrast, specific **analysis on the role of commercial properties was scarce**, reflecting the fact that statistics on CPPIs were simply not available for the vast majority of countries at the time of the GFC. Moreover, past US experience suggests that commercial real estate markets tended to play a more limited role in recessions, hence attracting much less attention than the residential segment did (Yavaş (2018)). This may reflect the smaller size of the commercial property market and the fact that housing services are an important element of the consumption basket (implying that RPPIs exert a greater influence on household consumption), among other factors.

Post-crisis move to compile CPPIs

Data efforts launched after the GFC have sought to address this information gap, especially in the context of the DGI (FSB-IMF (2009)). The first phase of this initiative (2009–14) focused mainly on RPPI statistics – for which significant progress has now been achieved in harmonising the related information sources, compilation methods, geographical coverage and classification (eg Eurostat (2013)). In particular, the BIS, together with other international organisations, has continued to improve its dissemination of relatively comparable RPPIs for major advanced and emerging economies (Scatigna et al (2014)) – with selected indicators covering almost 60 countries now published on a quarterly basis (BIS (2015b)).[4]

The **DGI's initial phase** acknowledged the importance of CPPIs, stating that *"information on commercial property is relevant not just for monitoring the wealth of the corporate sector, but also for financial stability more generally, given that commercial property accounts for a significant share of collateralized lending for many banks"*. But actual work was limited mainly to the recommendation to the main financial international organisations represented in the IAG[5] to *"consider including real estate prices (residential and commercial) in the Principal Global Indicators (PGI) website"*.[6]

The **second phase of the DGI**, initiated in 2015 and building on this preparatory work, gave a new impetus to both the compilation and dissemination of CPPIs (FSB-IMF (2015)). First, it reiterated their importance for estimating corporate wealth and capital formation, in turn supporting other areas of work – in particular, the measurement of non-financial assets in the sectoral accounts (whose development is a key objective of the DGI). Second, it highlighted their usefulness for detecting and monitoring asset price bubbles and thereby assessing broader financial stability implications – noting in particular that *"financial stability interest in the dissemination of CPPI data for monitoring commercial property asset bubbles as commercial property is used for banks' collateralized lending; and CPPI data is important for the valuation of securitized assets"*. Third, it recognised that, compared with RPPIs, CPPIS are at a less developed stage as regards compilation methodology, since *"there remain significant differences among experts in respect of the appropriate compilation methods given the very heterogeneous characteristics of commercial property and sparse transaction data"*.

In view of the above, it was decided to devote a **specific DGI recommendation** (no 18) to CPPIs, with two major points of focus: methodology and data dissemination. The IAG in collaboration with the Inter-Secretariat Working Group on

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[4] See the various property price data sets published by the BIS, at www.bis.org/statistics/pp.htm.

[5] The Inter-Agency Group on Economic and Financial Statistics (IAG) comprises the BIS, the European Central Bank (ECB), Eurostat, the International Monetary Fund (IMF, Chair), the Organisation for Economic Co-operation and Development (OECD), the United Nations (UN) and the World Bank (WB). It was established in 2008 to coordinate statistical issues and data gaps highlighted by the global crisis and to strengthen data collection.

[6] See www.principalglobalindicators.org.

Price Statistics[7] was accordingly tasked with enhancing the methodological guidance on the compilation of CPPIs and encourage their dissemination via the BIS website.

As regards data compilation and related methodology aspects, a key development was the publication of the **Eurostat Report** to support the compilation of CPPIs (Eurostat (2017)). However, reflecting persistent methodological difficulties, this report provided neither a harmonised methodological framework nor any specific methodological guidance for compilers. Turning to data dissemination, in 2010 the BIS started disseminating a limited number of CPPIs collected from national central banks as part of its general work on property price statistics. It decided in 2016 to enhance their publication (BIS (2016)), and country coverage has improved significantly since then. Currently, 39 series are available, covering 16 countries. This is far fewer than the almost 300 RPPIs series available for a much wider range of countries; but data availability has improved and the DGI is likely to spur further progress.

Indeed, both **international organisations and national authorities** continue to be actively engaged in work on CPPIs. An important step was the RPPI/CPPI G20 workshop organised by the IMF in coordination with the BIS, Eurostat, and the OECD and hosted by Argentina in January 2018 (FSB-IMF (2018)). This provided a useful opportunity to review the state of play in data compilation and identify remaining challenges. National experience underscored the importance of access to administrative and internet-based data, the usefulness of CPPIs for financial stability analysis, and differing practices across economies. A key message was that the way forward should be pragmatic and data-oriented, taking into account available private data sources for economies where no official indicators exist (O'Hanlon (2018a)). It was also felt that further international consultations would be needed to facilitate the dialogue between representatives from the public and private sectors as well as with academia – not least given the continuing lack of agreement among experts on definitions, breakdowns, sources and best compilation practices.

Central Bank of the Republic of Turkey Workshop on CPPIs

Against this backdrop, the **Central Bank of the Republic of Turkey (CBRT) organised a Workshop on CPPIs** in Cappadocia, Turkey on 8–9 May 2018, with support from the BIS Irving Fisher Committee on Central Bank Statistics (IFC). The event was attended by international organisations, central banks, statistical offices, academia and private companies from various countries. The aim was to discuss recent developments in the commercial property markets and share insights on compiling CPPIs. This allowed for a review of the different methodologies and an exchange of experience that proved particularly valuable for those institutions seeking advice on how to compile CPPIs. It was also useful for countries that have already made good progress in developing these indicators but are nevertheless still looking for advice on fine-tuning their methods.

The event covered **three main topics**: (i) the relevance of commercial property prices for supporting policy uses, especially for economic assessment, monetary

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[7] The mission of the Intersecretariat Working Group on Price Statistics is to develop and document best practice guidelines on concepts and methods of price statistics and indicators consistent with the established international standards on the subject and to encourage their use. It comprises several international organisations; see www.ilo.org/public/english/bureau/stat/download/cpi/iwgps/iwgtor.pdf.

policy, micro-level supervision and financial stability work; (ii) the various challenges in compiling representative and comparable CPPIs across countries, resulting in a general lack of high-quality data and preventing the identification of internationally agreed definitions and best compilation practices; and (iii) the ongoing initiatives being developed to address these issues.

2. CPPIs for policy use

Analysing the role of CPPIs for policy use raises three questions. What is the purpose of compiling these indicators? Who are the main users of the information collected? And what are their requirements?

High relevance of CPPI information to support financial stability work

At the level of theory, the **analytical framework that can benefit from CPPIs** data can be quite broad (Tissot (2018)). First, price movements reflect demand and supply factors that determine construction activity. Second, changes in property values modify balance sheet positions and, in turn, the saving/investment patterns of the firms holding these assets through the wealth effect channel. For instance, a firm seeing an increase in the value of its properties will be inclined to spend more and undertake new activities, other things being equal. More indirectly, this firm will be able to access funding more easily and on better terms, since it can borrow against the collateral of its tangible assets. Third, these mechanisms can be highly procyclical: by stimulating demand, higher prices will tend to reinforce themselves, leading to an overextension of credit and the build-up of fragilities. In contrast, falling prices will lead to tighter credit conditions for property owners and potential losses for credit providers, limiting real spending and in turn further weighing on asset prices. Such interlinkages between asset prices, financial conditions, balance sheet positions, credit supply/demand and actual spending are clearly of importance for public authorities responsible for macro-financial policies – especially in the fiscal, monetary and financial stability areas – as well as those responsible for the micro supervision of financial institutions.

The importance of CPPIs from a **financial stability perspective** is clearly illustrated by the IMF's Financial Stability Indicators (FSIs) (O'Hanlon (2018b)). Their purpose is to facilitate the detection of fragilities and risks in the financial system as well as the related vulnerabilities in the corporate and household sectors (IMF (2006)). The list of these indicators has been extended to include information on commercial real estate prices and on the relative importance of commercial real estate loans.

Main users of CPPI information

CPPIs have long been seen as a useful tool for monitoring financial stability and macroeconomic developments (see Graph 1 for commercial and residential property prices and GDP growth in the United States).

On the one hand, CPPI data are important for those in charge of monitoring **developments in the real sector**, for instance because of the associated spending effects. Moreover, data on CPPIs can also enhance statistical offices' compilation of

national accounts, as reported in the case of Portugal (Evangelista (2018)); such information is obviously useful for the estimation of property wealth and related deflators. It is also of interest to fiscal authorities and to monetary policymakers – in particular, by providing insights supporting inflation forecasting exercises as well as the analysis of monetary policy transmission mechanisms in general (eg the role played by bank credit).

Commercial and residential property price developments and real GDP growth in the United States

Annual growth, in per cent

Property price index:[1] —— Commercial —— Real GDP[2]
—— Residential
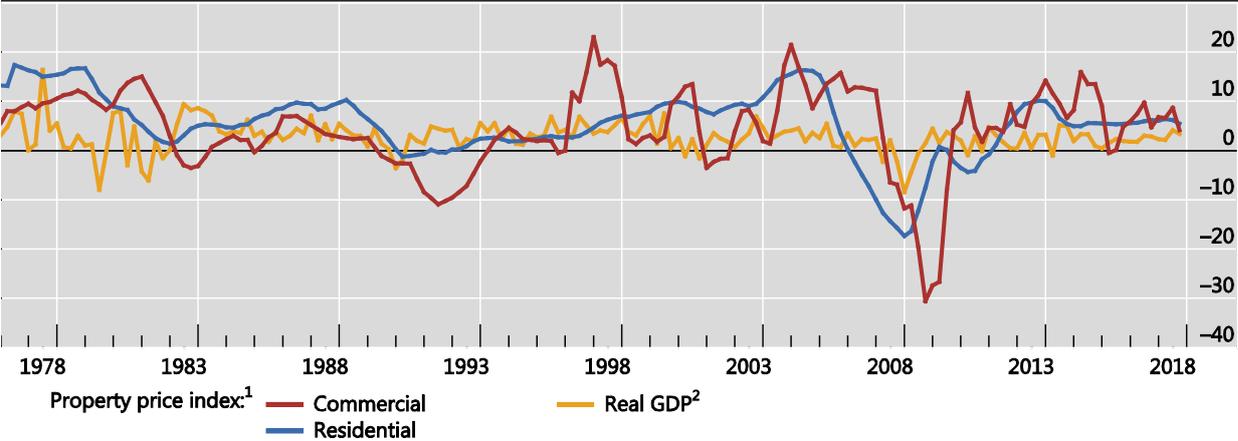
[1] Year-on-year growth rates.   [2] Seasonally adjusted annual rate.

Source: Board of Governors of the Federal Reserve System.

Authorities working on **financial stability issues** have also shown significant interest in using CPPI information, for both monitoring the macro-financial system and supervising individual institutions. The European Systemic Risk Board, for instance, has a steady demand for CPPI data for the purpose of monitoring and assessing systematic risks in the EU financial system in line with its macroprudential mandate (ESRB (2018)). Turning to micro supervision, the European Banking Authority (EBA) looks for similar information as part of its regular assessment of risks and vulnerabilities in the EU banking sector. For instance, its *Risk Dashboard*,[8] which summarises the main risks and vulnerabilities among a sample of EU banks, comprises indicators on exposures to real estate activities and construction.

Needless to say, **market investors** also need to assess the risks associated with developments in commercial property markets. In particular, there is significant interest in CPPI-related information derived from financial market indicators, not least because this can provide market signals on a "real-time" basis (Case (2018)). Attention has focused on indicators derived from the activities of REITs, which typically own income-producing real estate in various types of commercial property and may also be engaged in financing real estate.

[8]   Available on eba.europa.eu/risk-analysis-and-data/risk-dashboard.

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User requirements

Turning to the requirements of CPPI users, reliability and timeliness appear to top the list. Yet, there is no single indicator that could meet the requirements of all users, a telling example being the distinction between prices and values (Mehrhoff and Parlasca (2018)).

Typically, statisticians interested in **price measurement** will seek to allow for quality effects when tracing the evolution of CPPIs. Transaction-based, constant-quality indices would thus tend to serve most of their data needs, as they provide for changes in the composition of properties (eg their depreciation/obsolescence or, conversely, the impact of new investment on valuations). Several compilation techniques can be used to address these effects, including the repeat-sales method (with the sales price of the same piece of real estate being measured over time) and hedonic regressions (so as to measure the price of a property as a function of its underlying characteristics and the services provided to its owner (Silver (2018))).

On the other hand, other types of user may be more interested in **information on the values of properties** instead of prices. This is particularly the case for financial supervisors who need to monitor banks' exposures to the commercial property market, which depend ultimately on the collateral values of the underlying assets. What matters here is how these values might change after a credit is granted; there is less interest in considering potential changes in the characteristics of the property and measuring quality-adjusted price trends.

Another important issue is the **type of sectoral breakdown** required by users, which will depend on their analytical aims. For macroeconomic analysis and monetary policy, aggregate indicators are typically sufficient. In contrast, more disaggregated indicators may be useful for identifying financial stability vulnerabilities in a specific area, especially since prices may move in opposite direction across the various segments of the commercial property market. For instance, the Bank of Italy aims at publishing CPPIs with a rather detailed breakdown by property type (eg retail, office, industrial and logistical space; Zollino (2018)).

There may also be important **geographical disparities**. Indeed, the BIS has encouraged national authorities to publish property price indicators at the level of both the whole country and the capital city (or its main financial centre, not least considering the importance of foreign investors in these specific markets), based on a harmonised template (Szemere (2018)). As an example, the Bangko Sentral ng Pilipinas plans to publish official CPPIs for the whole country, the capital region and the areas outside the capital region, covering newly built offices, retail and industrial segments (Pelayo (2018)).

An additional complexity is that there is **no single "best" source** for compiling CPPIs that can address the broad range of user requirements. Certainly, official transaction records can be a privileged source for public authorities, providing some reassurance on the data collection process and compilation methodology. But this will be useful only if the information is provided in a timely manner, is sufficiently detailed in terms of eg the type of property considered, and is based on a sufficient number of transactions. Otherwise, such sources may have to be complemented with other types of data, ie appraisal or financial market-based indicators. This is already the practice followed by a number of compilers across the world, for instance in the European Union (Kanutin (2018)), Japan (Shimizu (2018)) and Portugal (Evangelista (2018)).

Lastly, policymakers and analysts may also need additional, more structural indicators in addition to CPPIs. In Europe, for instance, there is a significant demand for information related to activities in the commercial property market, in terms of eg rental prices, yields, construction starts and vacancy rates.

The specific information content of CPPIs

One important issue to consider when compiling CPPIs is whether the **information provided is useful**. In particular, collecting both CPPIs and RPPIs is only worth the effort if this provides complementary, not redundant, information (Tissot (2018)). Indeed, CPPIs and RPPIs can be driven by similar factors, such as the cost of credit, the price of land etc (ECB (2010)). There are also important similarities in terms of availability, type of event recorded, and even types of data – eg the situation in Portugal, where CPPIs and RPPIs are compiled from the same sources. Moreover, while commercial and residential price developments may not move hand in hand in the short term, their co-movements could be stronger on a longer time horizon, which is typically more important from a financial stability perspective.

Yet, empirical analyses suggest that CPPIs have a **higher volatility** and correlation with business cycles than RPPIs do, suggesting a faster reaction to changing economic and financial conditions (see Graph 1 for the US case). From this perspective, the information content of CPPIs would thus deserve specific attention (ECB (2010)).

A related question is the treatment of **"buy to let" property**, ie the purchase of housing with the specific intention to rent it. This type of property clearly has a double nature. On the one hand, it is a residential property, as it can serve as a shelter; on the other hand, it is a commercial property, as it generates income. Therefore, such properties may be included or excluded when compiling CPPIs, depending on users' requirements: to do so, a "building block" approach has been suggested by Eurostat (see Annex 2). But the situation is not always clear-cut, for instance when different types of property (eg retail premises, offices, residential flats) are located in the same building. These statistical treatments can significantly impact the degree of similarities in the information content of CPPIs and RPPIs.

Carefully considering these issues is particularly important given that, as noted above, the country coverage of CPPIs is much more limited than that of RPPIs (see Annex 1). If the **information content of RPPIs and CPPIs** is not too different, authorities may be invited to take policy measures in the commercial market based on information gathered in the residential segment. But, if the underlying situation is very different in these two market segments, the lack of CPPI data could potentially lead to misguided policy decisions.

3. Main challenges in the compilation of CPPIs

While there is a growing policy need for more information on CPPIs, statisticians still face **important difficulties** in compiling them. Indeed, and as recognised in the context of the DGI initiative, "*CPPIs are at a less developed stage than RPPIs, both conceptually and in terms of available data*". Certainly, important steps have been taken in recent years to both enhance the methodological guidance on CPPI

compilation and disseminate more data (eg through the BIS website). Yet important data limitations remain that still hinder the compilation of high-quality statistics which are harmonised across countries. Looking ahead, progress will depend on developing a common understanding of two key issues: the definition of commercial property; and the choice of adequate sources of information.

Data limitations

There are several reasons why the **availability of harmonised data** on commercial prices remains limited more than a decade after the GFC. These include the sheer variety commercial property types (eg shopping malls, apartment buildings), the heterogeneity of information sources (eg transaction- versus appraisal-based), the diversity of investors (eg residential property developers, industrial firms), the potential overlap between residential and commercial properties depending on national market characteristics (eg buy-to-let property), and multiple aggregation methods (Keiler (2013)). These factors can make national collection exercises challenging. For instance, Bank Indonesia collects data for 10 major cities and seven market segments but has to rely on surveyors with varying practices (Kurniati (2018)). These difficulties also highlight the need for internationally agreed definitions, to say nothing of consistent classifications.

These issues exist even within **Europe**. In 2017, Eurostat and the ECB conducted a stocktaking exercise on the availability of CPPIs, showing that official sources exist only in a small number of EU jurisdictions. In addition, private sources often present noticeable quality issues, reflecting in particular the fact that commercial data vendors can be reluctant to disclose their detailed methodologies and metadata – not least to exploit and protect the value of this information. As a result, most of the CPPIs published in the countries surveyed were of an experimental nature. A positive reading of the survey was that most countries had some structural indicators that could be used to analyse commercial property markets.

Statistical offices, central banks, and ministries must often **cooperate with commercial banks and property market data vendors** to address these limitations – eg the Bangko Sentral ng Pilipinas has access to a consultancy firm's database (Pelayo (2018)). In some cases, the information collected is relatively poor, obliging the compiler to conduct additional estimations. For instance, the Narodowy Bank Polski compiles CPPIs based on a commercial database that contains only the price and the date of transactions, and has to collect the additional metadata needed for hedonic regression calculations (Leszczyński (2018)).

The concept of commercial property

At present, there is no **international agreement** on what a single definition of commercial property should be, reflecting several points. One is that the features of national commercial real estate sectors tend to be quite country-specific, depending on various local factors – see the analysis of the Turkish sector in Alkaş (2018). Moreover, information needs can change over time; for instance, there has been a growing interest in recent years in green investment and the characteristics (eg vacancy rates, sustainability) of the associated commercial real estate projects – for an example of analysis based primarily on US data, see Arslanlı (2018).

Nevertheless, experts from the international organisations responsible for developing best practice guidelines on price statistics are tentatively considering a definition that would treat a property (together with the land on which it is situated) as **"commercial" if the underlying activity creates market output with the aim of generating profits**. Based on this consideration, commercial properties may include properties rented out at market prices; those under construction for future sale; and those used in the production of market goods and services (for example, retail premises, offices, factories and warehouses). But there are other considerations that can lead to substantial differences. For instance, one may also decide to categorise properties based on their use (ie housing); in that case, flats and houses rented out would not be considered as commercial properties.

In practice, one could define a relatively unified concept of commercial property by considering "building blocks" that can be part (or not) of the coverage of CPPIs (see Annex 2 and Eurostat (2017)). Under this approach, the broadest scope would include all properties other than owner-occupied housing and those used in non-market activities; but, depending on national circumstances, one could decide to leave out specific "blocks" (market segments).

Three main types of data source

Once the coverage of commercial property is defined, one can measure its price, decomposed into the **price of the land and the price of the structure** (Keiler (2013), Diewert et al (2016)). If there is no price information on vacant land, statisticians may estimate the land value by deducting the construction costs from the price of the commercial property.

Various concepts and methods exist for compiling the related price indices. **The three main approaches** are based on transactions, appraisals and financial market information (Silver (2018)). Each has advantages and drawbacks, and the best approach may well be to simply combine them. For instance, the Japanese Ministry of Land, Infrastructure, Transport and Tourism compiles the test release CPPI by combining information on transactions and real estate trust beneficiary rights disclosed by Japan real estate investment trust (J-REIT) funds(Shimizu (2018)).

A first possibility is to compile quality-adjusted CPPIs from **transaction records**. A major advantage is that land registries usually capture all transactions that are conducted in a relevant region. Yet this raises a number of challenges. First, the types of transaction taking place in the market can be very diverse, covering offices, retail spaces and industrial buildings, and it may be difficult to correctly capture their various characteristics. Second, major renovation and depreciation effects affect the values of the properties sold, complicating the task of estimating quality-adjusted prices. Third, prices may be recorded months after the parties agreed on them, so that the information can be significantly lagged and smoothed (Case (2018)). Fourth, the number of commercial property transactions is usually low, especially during recessions, which hampers the compilation of representative price indices – in Italy, for instance, their number fell significantly after the GFC and started to recover only several years afterwards (Zollino (2018)). A number of studies have highlighted some important limitations due to these challenges, especially when the limited number of transactions is compounded by highly differentiated market segments. Estimations from Poland suggest that this can result in single observations significantly distorting the aggregate CPPI index (Leszczyński (2018)).

Another approach is for compilers and statisticians to use **appraisal-based data**, at least as a complementary source to address the issues posed by a low number of transactions and/or data from very heterogeneous market segments. It may even be the single source available – in Turkey, for instance, the central bank has to rely on valuation data provided by commercial banks (Artman (2018)). However, appraisal-based data also have drawbacks. First, they often cover only a fraction of the market. Second, the appraisal quality depends on the expertise of the appraiser, who may be under pressure to bias the appraisal in the direction desired by the appraisal fee-payer (ie the buyer or the financial institution providing the loan). Third, appraisals may be conducted infrequently and aggregated over an extended period of time, with the risk of assessments being too conservative, for instance, if appraisers react too slowly to market movements. One reported example is the situation observed in Japan in the 1990s, when appraisal-based data provided a lagged picture of the property bubble build-up, in turn delaying policy response (Shimizu (2018), Shimizu and Nishimura (2006)).

The third source, **financial market data**, can provide near-real-time information derived from actual market transactions (eg investment in REITs). Such examples of CPPIs based on the performance indicators of portfolios investing predominantly in commercial properties can be found in many countries, for instance, in the United States (Case (2018)) as well as in Turkey (Coşkun and Erol (2018)) and Japan (Shimizu et al (2016)). This type of information has two advantages. First, financial market indicators provide rapid and frequent information, reducing the risk of lagged or smoothed signals. Second, they are accurate in the sense that they reflect actual market participants' views as they actually invest or sell. However, there are also important limitations when one is willing to use these data for compiling CPPIs. First, disentangling the price change of the underlying assets from other factors affecting a real estate fund's performance is no easy task. Second, the liquidity of these relatively specific market segments may not be sufficient, leading to a high volatility in measured indicators. Third, the related financial transactions may not be fully representative: for instance, the portfolio of REIT funds usually consists mainly of premium-segment properties, which does not reflect the whole market.

4. The way forward

Ongoing work at national levels

National experience shows that both **central banks and statistical offices** are significantly increasing their work related to CPPI compilation. A significant group of advanced and emerging economies have been compiling CPPIs for some time, sharing this information through the BIS – for instance, Indonesia, Japan, Philippines, Poland and Portugal (see Annex 1, which details the CPPI data set publicly available through the BIS website).

Another group comprises those jurisdictions where, despite significant progress in constructing CPPIs, the series are primarily used for **internal purposes** and not yet published (eg Italy, Turkey). In many other countries, authorities have put significant effort into preparing for potential data collections. In the United Kingdom, for instance, the National Statistical Office has been conducting a stocktaking exercise, which is a key precondition when preparing for a CPPI compilation (Lewis (2018)).

Another lesson is the significant **diversity of the approaches** followed, underlining the lack of international harmonisation. As described above, a key reason is the various challenges faced in compiling CPPIs, especially the diversity of the sources used and of their geographical and sectoral coverage. Sometimes this diversity can be welcome, for instance, in Italy, Japan and Portugal, where the public compilers of CPPIs can exploit multiple, complementary sources to enhance market coverage. For instance, Statistics Portugal cooperates with the central bank to compute CPPIs using information derived from property tax and transaction records; in addition, the office is investigating alternative data sources to increase publication frequency (Evangelista (2018)). In Italy, the central bank compiles an experimental indicator derived from the transaction-based data sets of two private research institutes and a government agency (with different methodologies, coverage, frequency and segmentation), and it is considering the inclusion of valuation-based indicators in addition (Zollino (2018)). Yet these arrangements can add complexity, further undermining international comparability.

International initiatives

In view of the G20 DGI recommendations and of the growing interest shown by national policymakers, international organisations have cooperated actively with national statistical bodies to promote the compilation and publication of CPPIs. This workflow has three main elements.

The first is **conceptual work**, with the aim of agreeing on relevant definitions and classifications, and providing guidance on the sources and quality adjustment methods that could be used. A key building block was the publication of the Eurostat guidance (Eurostat (2017)). Yet this initiative, mainly of a descriptive nature, needs to be furthered in order to develop internationally agreed recommendations. The work required should be pragmatic and take due consideration of current limitations in terms of data availability. This means that the concepts and definitions cannot be agreed in a vacuum, as they need to be closely related to national experience.

The second element is to provide support to national statistical authorities in the **actual compilation of CPPIs**. In particular, the IMF has traditionally put significant resources into providing such technical assistance (O'Hanlon (2018b)). In Europe, important coordination efforts are also promoted by the ECB and Eurostat in particular. As regards the BIS, which hosts the IFC, a key contribution is to facilitate the exchange on experiences among central bank statisticians, their counterparts in national statistical offices and international organisations, and academia and the public.

The third international agenda element is to **enhance the dissemination of CPPIs**. At the IMF, a particular effort is under way in the context of the FSI indicators (see above). The BIS, with the support of its member central banks, is progressively expanding the publication of CPPIs collected from various (mainly public but also private) sources. To facilitate the exchange of national experiences, but also to address the challenges posed by various compilation practices, particular attention has been paid to setting up a harmonised metadata template. A specific focus has been to promote the use of CPPI-related information in flagship publications and policy discussions (Szemere (2018)). Lastly, several initiatives are under way at the European level. In particular, the ECB already publishes experimental CPPIs for the euro area (Kanutin (2018)), derived from various sources including commercial

vendors when public information is lacking. The ultimate aim is to collect and publish complete and comparable indicators by property type and countries, and on a quarterly frequency.

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Inventory of commercial property price data published by the BIS

Countries	Number of series	Geographical coverage			Source of price information			Property type		Starting year;[1] frequency
		All	Cities	Capital	Transaction	Appraisal	Offer/Survey	Only land	Building/unit[2]	
Brazil	**2**	✓	✓			✓	✓		✓	**2000, quarterly**
Denmark	3	✓			✓	✓			✓	1992; quarterly
Euro area	**1**	✓			✓	✓			✓	**2000; quarterly**
Germany	**6**	✓	✓		✓	✓			✓	**1995; annual 2008; quarterly**
Greece	4	✓		✓		✓			✓	2006; half-yearly
Hong Kong SAR	2	✓			✓				✓	1993; monthly
Iceland	2	✓			✓				✓	1995, quarterly
Indonesia	**1**			✓	✓				✓	**2002; quarterly**
Japan	**6**	✓	✓	✓		✓	✓	✓	✓	**1955; half-yearly, 2008; quarterly**
Korea	**1**	✓				✓		✓		**1987; monthly**
Philippines	1			✓	✓			✓		2008; quarterly
Poland	3		✓	✓	✓				✓	2000; annual
Portugal	**1**	✓			✓				✓	2009, annual
Saudi Arabia	**2**	✓		✓	✓				✓	**2014; quarterly**
Singapore	3	✓			✓				✓	1998; quarterly
United States	**1**	✓			✓	✓			✓	**1945; quarterly**

[1] Earliest, in the case of more than one series.   [2] For example: industrial, office or retail.

Sources: BIS property prices statistics, based on national data

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[9]   The ECB indicates the annual growth rate of experimental CPPIs of further EU countries in tables. Among the G20 countries not covered in the BIS publication, the ECB presents data based on private sources for France and the United Kingdom: sdw.ecb.europa.eu/reports.do?node=1000003736

Annex 2: Eurostat's building-block approach to the demarcation of commercial and residential property

(comprising residential and non-residential assets, depending on owners' type of activity)

Assets / *Activities*	Residential properties		Non-residential properties
Selling and renting of real estate	Rental housing	*of which* *Owned by households*	Investment properties
Construction of buildings	Residential buildings under construction	*of which* *For use by owner-occupiers*	Non-residential buildings under construction
Own use	Owner-occupied housing		Corporate properties
Non-market	Social housing		Other non-residential properties

Note: The columns refer to the type of property asset while the rows refer to the economic activities involved. The table includes all property assets, both residential and non-residential. The broadest concept of commercial property comprises the blocks highlighted in grey. However, depending on the statistical purpose, some of these blocks may be considered non-commercial and are thus taken out of the scope of commercial property. The blocks not highlighted in grey should not be considered as part of commercial property (this is the case, for instance, for all properties used for non-market activities).

──── : Broadest concept of commercial property.

Source: Eurostat (2017): Commercial property price indicators: sources, methods, issues, pp 31–2.