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COVID-19 and the commercial real estate market in Ireland

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Central Bank of Ireland

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Abstract

This *Note* documents developments in the commercial real estate (CRE) market in Ireland since the onset of the COVID-19 shock as well as examining the factors determining the outlook. The CRE market is important to monitor from a financial stability perspective owing to its size and systemic interlinkages to both the real economy and the wider financial system. We show that the CRE market in Ireland has experienced a downward adjustment in valuations since the onset of the COVID-19 shock with the retail sector particularly affected. We highlight that components of the CRE market such as the retail and office sectors are particularly vulnerable to both near-term and structural implications of the COVID-19 shock such as the rise of online shopping and increased working from home practices. We combine a range of analytical approaches including forecast modelling techniques, the extension of the growth-at-risk framework to CRE and scenario analysis to assess the potential downside risks to the CRE market in Ireland.

1 Introduction

The COVID-19 pandemic triggered a sharp slowdown in economic activity that adversely affected commercial real estate (CRE) markets worldwide. While the price of Irish CRE assets had been stabilising with a moderation in the growth of capital values and rents throughout 2019 and in early 2020, the market continued to attract significant volumes of investment. Owing to the uncertain macro-financial outlook since the onset of the COVID-19 pandemic in March 2020 however, the CRE market in Ireland has experienced downward adjustments in valuations and rents with the retail sector particularly affected. Public heath restrictions aimed at limiting the spread of the virus led to the temporary closure of retail outlets and other commercial properties while the COVID-19 shock has also had an impact on the office sector with many office workers continuing to work from home.

In addition to these near-term developments, the COVID-19 shock has prompted and accelerated structural changes in the CRE market that had been slowly emerging in recent years. In particular, the rise of online shopping (hereafter "e-retail") has grown since the onset of the COVID-19 shock with public health restrictions impacting footfall and the demand for traditional retail products and services. Given the closure of retail outlets, the COVID-19 shock has boosted online shopping volumes. It is also likely to affect the future outlook for the office sector with a high degree of remote working expected to remain a feature in the post-COVID-19 era. Recent survey evidence

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suggests that increased working from home practices are likely to be a key component of companies' post COVID-19 business operations (see, for instance, Maqui and Morris, 2020). Similarly, survey results aimed at understanding employee preferences in the post-pandemic period indicate that an increasing number are in favour of working remotely in the post-COVID-19 period (see, for instance Barrero et al., (2021) and McCarthy et al. (2021)).

Given its size and interlinkages with the real economy and across the wider financial system, significant changes in the functioning of the CRE market are likely to have a material macro-financial impact. As noted by ESRB (2018), commercial property markets represent an important source of systemic risk as the sector is capital-intensive, with CRE investors often leveraged and heavily linked with financial institutions. Moreover, commercial property is often used as collateral underpinning financial transactions while declines in CRE prices could impact the financial system through increased credit risks or losses on direct holdings (ECB, 2021). Therefore, the financial system's exposure to the CRE market remains significant, although it has evolved in recent years. For instance, while banks remain key players in providing debt financing to the CRE market, their exposures have reduced significantly over the past decade. At the same time, a range of non-bank financial institutions such as investment funds, real estate investment trusts, insurance corporations and other non-bank entities are increasingly exposed to developments in the CRE market through a variety of channels, including direct investments in CRE assets as well as, in some cases, also providing debt financing. This is especially the case in the low interest environment given investors' increased search for yield.

From a financial stability perspective, a sharp fall in investor sentiment and/or a withdrawal of foreign investment from the domestic CRE market could have an adverse impact on the financial system and real economy. In particular, a substantial fall in commercial property prices would likely have negative implications for the real economy through knock-on collateral, wealth, investment and employment effects. Understanding the systemic relevance of the CRE market in Ireland, including the impact of the COVID-19 shock and the potential outlook for the sector is therefore important to inform policymakers and the supervisors of financial institutions alike.

In this *Note*, we document developments in the CRE market in Ireland since the onset of the COVID-19 pandemic. We show that the aggregate CRE numbers mask heterogeneity at a sectoral level. For example, the retail sector has been one of the hardest hit by COVID-19 restrictions, while the office sector has also been affected albeit to a lesser degree. The vacancy rate for the Dublin office market increased to over 9 per cent at the end of 2020 from approximately 5 per cent in 2019 with structural changes such as an increased instance of remote working likely to have a greater influence on the office sector over the coming years. In contrast, capital values and rents in the industrial sector[2] grew during 2020, on the back of robust demand from occupiers and investors, and shortages in the availability of modern stock.[3]

The *Note* also draws on and combines a number of analytical approaches to examine the outlook of the CRE market in the coming years. First, we show that simple models perform relatively well in forecasting the CRE market in Ireland. Second, building on Adrian et al. (2019), we employ the "at-risk" framework to assess how financial conditions and systemic risk levels contribute to the possibility of future episodes of weak CRE capital growth. To the best of our knowledge, this is one of the first papers to apply the "at-risk" framework to quantify CRE tail risks in this way. Our results show that the COVID-19 shock has had a significant effect on downside risk in the Irish CRE market. Third, we examine the implications of structural changes in the office market, such as increased adoption of remote working practices amongst employees, a process that has been accelerated since the onset of the COVID-19 shock. In particular, applying a scenario analysis and a range of

[2] This sector includes elements of manufacturing, warehousing, logistics and distribution.

[3] See, for instance, CBRE (2021). It is also worth noting that these market dynamics were occurring against a backdrop of significant change within the sector, not least in terms of required adjustments to channels of supply and distribution. These changes were occurring as a result of the COVID-19 shock as well as the increased uncertainty surrounding the ending of the Brexit transition period in December 2020.

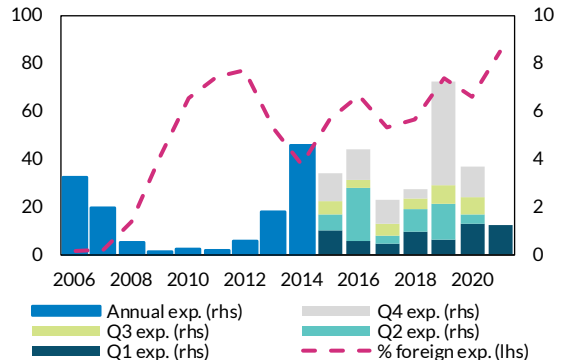
survey data and underlying assumptions, we show that such structural changes could potentially have a material impact on the vacancy rate in the Dublin office sector over the coming years.

As noted below, however, it is important to highlight that these are mechanical scenarios based on assumptions – which are subject to extreme uncertainty and potentially subject to change given the unprecedented nature of the COVID-19 shock. Nevertheless, they illustrate how sensitive developments in the office segment can be to more persistent shifts in behaviour stemming from the pandemic. It is also important to acknowledge the significant changes which have occurred in Ireland's commercial property landscape over the past decade, as described in Section 2. Moreover, it is clear from the indicator of CRE price misalignment, as shown in Figure 4, that any current deviation of Irish commercial property capital values from what one would expect, is far below the levels recorded in the run up to the 2008 global financial crisis.

2 Recent developments in the CRE market in Ireland

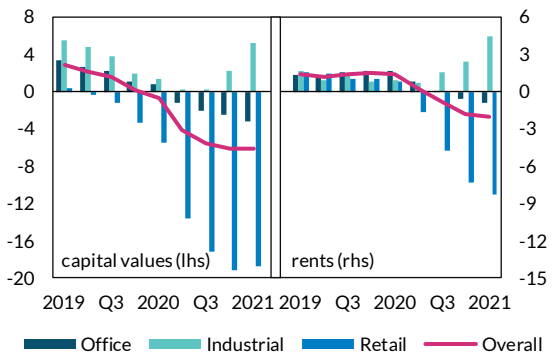
The financing and nature of investment in the CRE market in Ireland has evolved in recent years. In particular, the funding of the Irish commercial property market has become more diverse over the last decade with foreign investors and non-bank financial institutions now playing a greater role. Prior to the 2008 global financial crisis, investment in Irish CRE came primarily from domestic investors who were in turn debt financed by the domestic banking system. The financing of Ireland's commercial property market from the domestic banking system has declined however, from approximately €37 billion in 2013 to approximately €11 billion in 2020. A large share of CRE investment now comes from international investors intermediated via investment funds (Figure 1). As noted in Central Bank of Ireland (2020), Irish resident investment funds now account for over 40 per cent of the estimated invested CRE market in Ireland. To support their commercial property investments, these funds borrow from a mix of domestic and international banks, shareholder loans and other financial institutions (see, for example, Coates et al, 2019; Cima, Killeen and Madouros, 2019 and Daly, Moloney and Myers, 2021 for an overview).

Figure 1: Investment expenditure on Irish commercial property (per cent)



Source: CBRE & JLL and authors' calculations.
Note: Last observation 2021Q1

Figure 2: Annual change in CRE sectoral capital value and rental growth indices (annual percentage change)



Source: MSCI and authors' calculations.
Note: Last observation 2021Q1

Ireland's invested commercial property market posted its weakest performance of recent years in 2020. Total returns on investment in Irish CRE, which had been slowing markedly[4], turned negative last year as capital values and rents declined with the onset of COVID-19. Declines in annual capital values of more than 6 per cent (Figure 2) represented the steepest decline since 2012. Similarly,

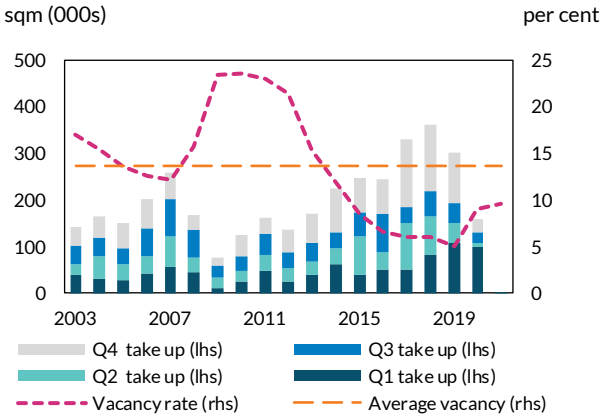
[4] For instance, annual total returns for 2014, 2016, 2018 and 2020 amounted to 36 per cent, 13 per cent, 10 per cent and -1.4 per cent, respectively.

commercial property rents are approximately 2 per cent lower on an annual basis, according to the latest data (Figure 2).[5]

Aggregate figures, such as these, mask a wide variance in performance at a sectoral level. As shown in Figure 2, the largest declines in capital values and rents have occurred in the retail sector. It is noteworthy that retail capital values had been declining and rental inflation easing for some time before the emergence of the COVID-19 shock in the first quarter of 2020, due in part to structural changes occurring within the sector such as the rise of e-retailing. Data for the period since 2020Q1 however, illustrates how the COVID-19 shock has exacerbated these declines. The closure of many retail units as a result of the public health restrictions imposed throughout much of last year, is likely to have had an adverse impact on the confidence levels of both existing and potential retailers. This may lead to lower demand for (new) retail space and a decrease in retail rent collection rates, with further possible negative implications for capital values in the retail sector.

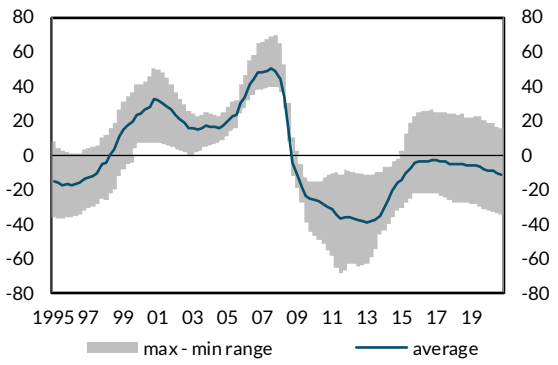
While the retail sector has been one of the hardest hit by the COVID-19 crisis, the impact on the office sector, though negative, has been less adverse. Capital values and rents in that sector recorded annual declines of approximately 3 and 1 per cent respectively in 2021Q1, their largest falls in eight years. In contrast, the industrial and logistics sector, comprising, for example, factories and industrial production facilities, warehousing, delivery depots, continue to perform comparatively strongly. Annual capital values and rents in the sector rose by more than 5 and 4 per cent, respectively in the opening quarter of 2021, leading to positive total returns of 4.7 per cent which are in line with broader international trends.

Figure 3: Dublin office stock take-up, vacancy rate



Source: MSCI
Notes: Last observation 2021Q1

Figure 4: CRE value misalignment indicator - Ireland (deviation from average - per cent)



Source: MSCI/IPD, CSO and authors' calculations.
Notes: This indicator is based on the average deviation of 5 commercial property ratio indices - CRE capital values to CRE rents, CRE yields, CRE capital values to GNI*, CRE capital values to consumption and CRE capital values to employment - from their individual long-run averages. See Box 6 in ECB (2011). Latest observation 2020Q4.

The negative impact of the COVID-19 shock is also evident in recent data pertaining to the take-up of Dublin office space. Following a 50 per cent decline in office letting activity last year, less than 4,000 square metres of space was taken-up in the opening quarter of 2021 (Figure 3). This latter figure was 63 per cent lower than the previous lowest Q1 take-up, which occurred in 2009, during the global financial crisis. Meanwhile the Dublin office vacancy rate has increased to well over 9 per cent by 2021Q1, from just over 5 per cent before the arrival of the pandemic (Figure 3). As with the retail sector, the office market too faces its own structural challenges such as increased remote

[5] Annual total return, capital value and rent data for the Irish CRE market are obtained from the MSCI/SCSI Ireland Quarterly Property Index.

working and an acceleration of digital technology likely to facilitate off-site working. An increase in the willingness of companies to facilitate their staff to work remotely, accelerated by the COVID-19 shock, will likely affect requirements for office space going forward. Much will depend on what companies and employees decide is the optimal split between working from home and time spent on site. With a further 1.2 million square metres of office space, at various stage of the delivery pipeline (i.e. units under construction, with planning permission or applying for planning permission), this could potentially give rise to risks involving the potential for an over-supply of office space in the Dublin market. Moreover, it may be the case that some of the existing office space is redesigned to allow for additional space per employee or repurposed to facilitate additional shared on-site collaboration spaces (e.g. meeting rooms, training facilities) and amenities (e.g. canteens/cafes, gyms/changing rooms).[6] Section 4 provides a summary of a scenario analysis capturing different assumptions and its potential impact on the vacancy rate in the Dublin office market.

As noted by IMF (2021), misalignments in CRE prices, especially where these interact with other vulnerabilities, increase downside risks to future growth due to the possibility of sharp price corrections. The misalignment indicator for Ireland, as shown in Figure 4, does not suggest that CRE prices in Ireland were misaligned at the outset of the COVID-19 shock. Indeed, this indicator remained well below levels seen in the run up to the global financial crisis of 2008. Following the analytical approach of ECB (2011), this indicator is based on the average deviation of five commercial property ratio indices including CRE capital values to CRE rents, CRE yields, CRE capital values to GNI*, CRE capital values to consumption and CRE capital values to employment from their individual long-run averages. It is one of a suite of indicators and analytical approaches employed by the Central Bank of Ireland when assessing developments in the CRE market. Looking ahead, the outlook for CRE values in Ireland in the short to medium term is weak. Survey data and the latest market forecasts point to a weakening outlook. For instance, market participants expect CRE capital values and rents to decline over the next 12 months, though the extent of the decline is expected to be slightly smaller than that foreseen after the initial onset of COVID-19.[7]

3 Analytical approaches to assessing developments in CRE

This section briefly introduces a number of analytical approaches and modelling techniques used by Central Bank of Ireland to assess developments in the CRE market in Ireland. In particular, we (i) use a number of forecasting models to examine the outlook for CRE values and ii) extend the "at-risk" framework to the CRE market, whilst utilising forecasts from i). The combination of the forecast models with the at-risk framework allows us to assess CRE prices "at-risk" in future periods.

3.1 Forecast Modelling Approach

Forecasting asset prices is extremely difficult, both in normal times and even more so in times of high uncertainty. Still, from a financial stability perspective, it can be useful to employ time-series modelling approaches to consider how different shocks may affect CRE values. To this end, the Central Bank of Ireland maintains a suite of forecasting and valuation models to assess developments in Ireland's CRE market. While an explanation and presentation of each model is beyond the scope of this *Note*, this section briefly outlines two such models used to assess potential future developments in the CRE market in Ireland. While the first model considers aggregate CRE capital values, the second model focuses specifically on the Dublin office market.

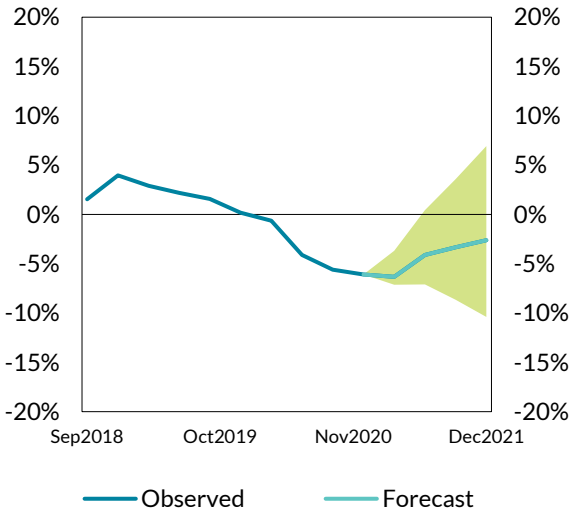
In particular, we can assess CRE price dynamics using models that are characterised by dynamic fluctuations around a persistent long-term trend and therefore have been put forward to model

[6] See, for example, CBRE (2021).
[7] On an international basis, Ireland is also among a cohort of countries expected to experience the largest declines in capital value growth over the coming year. See RICS Economics (2020).

variables with a high degree of stickiness such as real estate prices (see Gattini and Hiebert (2010)). Further detail on the modelling approach can also be found in Appendix A. Building on the methodology outlined in the ECB's assessment of commercial property price misalignment (ECB (2011)), we proxy macroeconomic conditions relevant for the demand for commercial property through employment, CRE rental values and CRE yields.[8] Figure 5 displays the forecasted growth rates for CRE capital values over 2021. Based on these projections the downward trajectory of CRE price growth is expected to rebound after the first quarter of 2021 although CRE growth rates remain negative. Given the uncertain macro-financial outlook, this forecasting model can usefully complement other analytical approaches such as the "at-risk" framework to assess developments in the CRE market in Ireland.

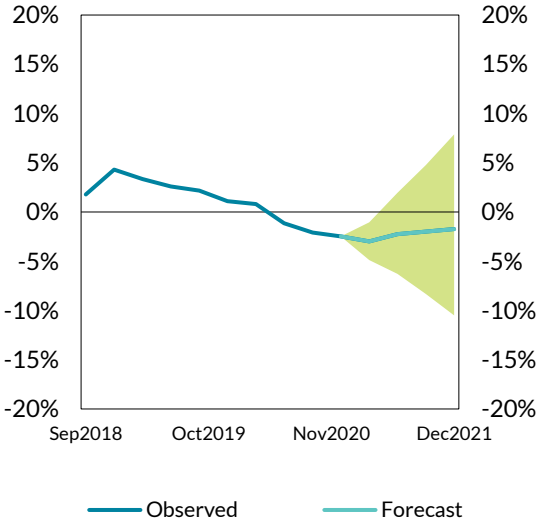
The office-market CRE model also builds on the econometric framework outlined in Appendix A. Nonetheless, it differs from the model described in the previous paragraph in two substantial ways: First, the variables included seek to account for the economic conditions that are relevant to office specific CRE. Therefore, we consider office-based employment that is proxied through the sum of employees working in the largely office based "administrative and support service activities", "financial, insurance and real estate", "information and communication", "professional, scientific and technical activities" and "public administration and defence, compulsory social security" NACE sectors, office market rental values and office market yields. Second, we also consider office specific vacancy rates.[9] Unconditional forecasts for office specific capital values over 2021 are displayed in Figure 6 which suggest growth rates of office capital values that are similar to the expected overall CRE market (Figure 5).

Figure 5: Annual growth in aggregate CRE capital values (per cent)



Source: Authors' calculations.
Note: Estimation based on data up to 2020:Q4, projections 2021:Q1-2021:Q4

Figure 6: Annual growth in Dublin office capital values (per cent)



Source: Authors' calculations.
Note: Estimation based on data up to 2020:Q4, projections 2021:Q1-2021:Q4

3.2 Growth-at-Risk in CRE

Assessing downside risks to real estate asset values is important from a financial stability perspective as significant price corrections can have wider macro-financial impacts with spill over effects for both the real economy and broader financial system. To capture the downside risks in Ireland's CRE market, we next apply the "at-risk'' framework developed by Adrian et al. (2019) on a

[8] The ECB's measure of CRE misalignment is also included as indicator in the Central Bank of Ireland's Systemic Risk Pack.
[9] The office-based employment and office vacancy rates are based on figures for the Dublin market.

panel of 16 countries using data from 1990Q1 to 2020Q4. [10] The CRE growth-at-risk is defined as the 5th percentile of the estimated distribution conditional on a set of economic and financial variables. [11] This methodological approach has been applied to a variety of growth series including GDP growth, bank capital, inflation and residential house prices.[12] With regard to the latter, IMF (2019) introduces the concept of house-prices-at-risk (HaR) and suggests that it can be used as an early-warning indicator for financial stability similar to GDP growth at-risk analysis.[13]

In this *Note*, we focus on assessing downside risks in CRE markets. To the best of our knowledge, this is one of the first papers to apply the "at-risk" framework to quantify CRE tail risks in this way.[14] In line with the methodology, we use a panel quantile regression to model future CRE price growth as a function of current price growth in CRE markets and on a set of relevant financial variables. The model is estimated as follows:

$$CREgro_{t+h,i,j} = \alpha_j + \beta_{1,j} CREgro_{t,i} + \beta_{2,j} CLIFS_{t,i} + \beta_{3,j} CredGap_{t,i} + \beta_{4,j} Misalign_{t,i} + \delta iFE_i + \epsilon_j$$

$CREgro_{t+h,i,j}$ refers to the CRE growth in country "i's" CRE index over the coming "h" quarters. Quantile regressions are repeated for each quantile "j" from 1 to 99.[15] The other explanatory variables included are the following:

- **Financial Stress:** To capture the level of financial stress in the market, we employ the country-level financial stress index (CLIFS) sourced via the ECB's Statistical Data Warehouse (SDW). In the case of Ireland, we use the Irish Composite Stress Index (ICSI).

- **Credit:** Periods of excessive credit have been associated with bubbles in real estate markets (see Goodhart and Hofmann, 2008; Schularick and Taylor, 2012; Pavlidis et al., 2016). To measure the impact of credit variation on the CRE market, we employ the Credit-to-GDP gap by the Bank of International Settlements (BIS) and the alternative credit gap measure for Ireland.

- **Current CRE growth:** One of the main drivers of future growth is current CRE growth, as observed in the year preceding the forecast. Including current growth captures persistence in commercial real estate cycles. An increase in current growth rates should result in a higher forecast growth rate, especially over the subsequent four quarters. However, our robustness tests have shown that the CRE growth-at-risk specification, as described in this *Note*, produces more accurate forecasts than those derived from models which are based on autoregressive specifications (i.e. models that are used to generate growth forecasts relying exclusively on past CRE growth rates and which use no other available information).[16]

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[10] Our sample consists of Ireland, Austria, Belgium, Germany, Denmark, Spain, Finland, France, UK, Hungary, Italy, Netherlands, Poland, Portugal, Sweden and the US.

[11] The methodology can be applied to different percentiles, but we focus our attention to the 5th percentile and the median estimation in line with the literature on the "at-risk" modelling,

[12] The GDP growth-at-risk approach has been adopted by Alessandri et al. (2019) for Italy, Arbatli-Saxegaard et al. (2020) for Norway and O'Brien and Wosser (2021) for Ireland. Lang and Forletta (2019) extend the framework to capture banks' capital-at-risk. Tagliabracci (2020) estimates the conditional distribution of euro area Inflation.

[13] Deghi et al. (2020) estimate the conditional probability of house price growth in 22 advanced and 10 emerging economies and find that credit growth, financial conditions, GDP growth and price misalignments in the housing market can be used to capture the future left tail of house price growth distribution. Moreover, Alter and Mahoney (2020) estimate the HaR at the city level using data from 37 cities across the United States and Canada.

[14] IMF (2021) examine the effect of commercial real estate prices misalignment on the downside risk to GDP growth.

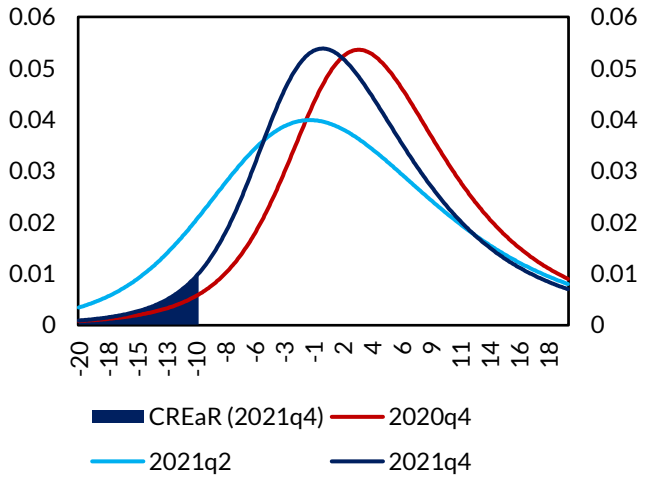
[15] Future growth is conditioned on current growth $CREgro_{t,i}$ in recognition of the fact that economic growth series, such as CRE, tend to be time-correlated.

[16] Details of this testing are beyond the scope of this *Note*. In essence forecast errors, representing the difference between actual CRE growth and forecasts made by the GaR specification and also by an

- **CRE misalignment index:** We employ a CRE misalignment index, as developed by ECB (2011) and shown in Figure 4 for Ireland. The composition of this index is outlined in Section 2.

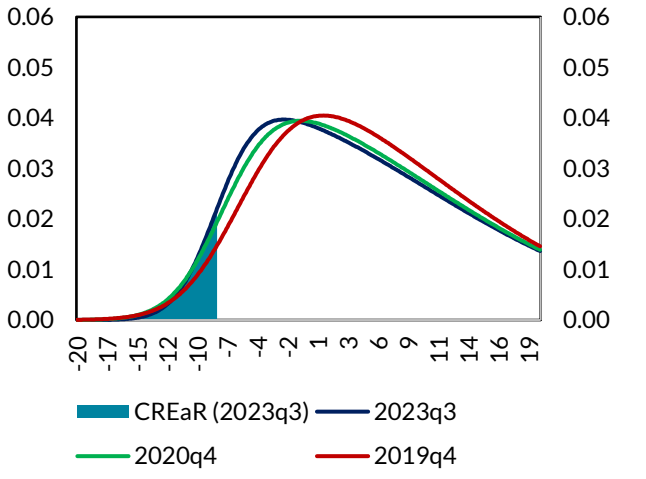
The "at-risk" framework therefore provides an empirical way to track the range of expected developments in CRE markets over a chosen forecast horizon. By examining the 5th percentile of the forecast distribution we can quantify the evolution of downside risks in CRE markets in Ireland over time. While the evolution and magnitude of downside risks is the primary focus of such an empirical framework, the likelihood of that outcome is also a key consideration. For instance, tighter distributions reflect more certain forecasts whereas wider distributions imply greater forecast uncertainty, particularly as these relate to central or "most likely" outcomes.

Figure 7: Year-on-year CRE Growth Forecast (IE) and CREaR



Source: Authors' calculations based on data from a number of sources.
Note: Based on Growth at Risk Framework. See Financial Stability Note 2021 No. 2. In this specification, we assume the credit gap in Q3 and Q4 2020 takes the same value at Q2 2020 given that Q2 2020 is the latest observation for this data. Y axis data represents likelihood of growth outcomes, x axis reflects forecast growth rates.

Figure 8: Three year ahead annualised CRE Growth Forecast (IE) and CREaR



Source: Authors' calculations based on data from a number of sources.
Note: Y axis data represents likelihood of growth outcomes, whereas the x axis reflects forecast growth rates. Last observed data 2020Q3, with forecast growth for 2020Q4 and for each period up to and including 2023Q3 coming from the forecast model described in Section 3.1

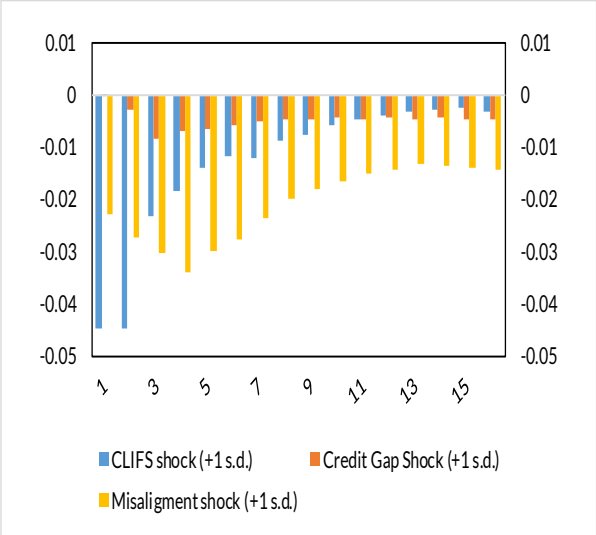
We first examine the impact of the COVID-19 shock on Irish CRE prices by illustrating the T+4Q ahead forecast distribution of CRE growth for 2020Q4, alongside equivalent forecasts for 2021Q2 and 2021Q4 (Figure 7). Each T+4Q ahead forecast relies on known input variable data as observed four quarters prior to the forecast. Also shown is the 5th percentile CRE growth forecast for 2021Q4, shown by the shaded area and termed the CRE-at-risk (or CREaR). The shock had a significant initial effect on Irish CRE prices throughout 2020 with the 2021Q2 distribution shown to be flatter and with the tail risk (CREaR) increasing from -7.70 per cent to -14.77 per cent. However, the forecast for 2021Q4 indicates some improvement throughout the year with the tail risk in the last quarter of the year easing to a value of -9.44 per cent. This easing is associated with the return of the financial conditions index to pre-pandemic levels following the initial upwards spike in 2020H1.

autoregressive model show that forecast errors are reduced by circa 30 per cent in the case of GaR forecasts, compared with autoregressive model forecasts.

Next, we link our two analytical approaches to consider downside risks over a three year horizon. In particular, we take the CRE forecast as presented in Section 3.1 and employ it as an input to the CRE growth-at-risk framework presented above. In this way, we can draw on the respective strengths of the forecast model which incorporates important macroeconomic data such as unemployment rates and CRE yields and consider it alongside the percentile-at-risk flexibility inherent in the growth-at-risk framework. The latter uses coincidental financial conditions, systemic risk and CRE price misalignment data as described above.

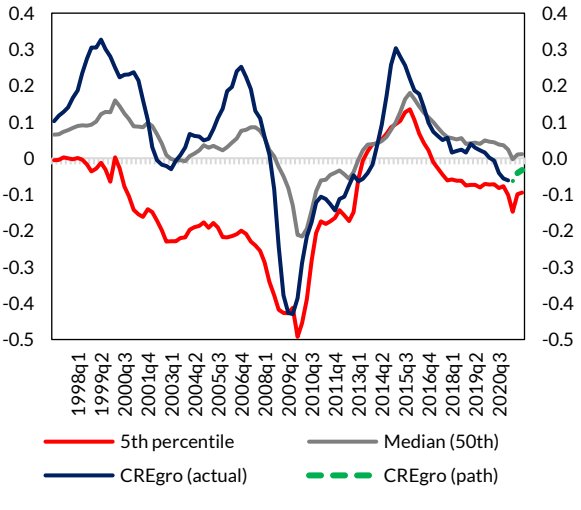
Figure 8 shows T+12Q (annualised average) forecasts, modelled on three-year ahead CRE growth rates. Observed three year ahead growth rates are included in the data sample up to 2020Q3. Commencing 2020Q4, and continuing on a quarterly basis up to and including 2023Q3, we rely on CRE growth forecasts which are the outputs of the forecast model described in Section 3.1 above. As per the T+4Q forecasts of Figure 7, the T+12Q ahead forecasts reflect a left shift of the forecast distribution along with an increase of the probability of tail event. Such a shift implies an increase in the tail risk of Irish CRE asset prices. This left shift is not as extensive as that observed using the T+4Q ahead data, implying that the longer term impact of the COVID-19 shock has not yet fully filtered into our CRE at risk model, particularly over longer forecasting horizons. Figure 8 further shows that, similar to other markets, when the forecasting horizon is longer the tail risk tends to be higher in Irish CRE markets. The relatively more skewed distribution reflects higher frequencies of positive CRE growth rates, estimated over three year intervals. However, whenever tail events materialise, they tend to be quite severe.

Figure 9: CRE at Risk response to input variable shocks



Source: Authors' calculations.
Note: T+Qh impact over h periods (x-axis) on 5th percentile CRE growth forecasts resulting from a 1 s.d. shock to each of financial conditions (CLIFS), Credit Gap and Misalignment variables.

Figure 10: CRE actual growth compared with T+4Q expected and "at risk" growth rates



Source: Authors' calculations.
Note: T+4Q forecasts of CRE growth at the median and 5th percentile (CRE at risk) levels. Actual annual growth also shown. Last observation 2020Q3 with CRE growth forecast from model described in Section 3.1 shown in green.

Figure 9 illustrates the differential impact on future CRE growth accompanying a one standard deviation shock in the key explanatory variables. The financial conditions shock results in a considerable decline in CRE growth of -4 percentage points that fades out gradually after nine quarters. The impact is more pronounced in the short-term, in line with the "at-risk" literature (see O'Brien and Wosser, 2021). Credit gap and misalignment shocks result in lower growth rates after three and five quarters respectively. The credit gap shock has a moderate effect below -1 percentage points, whereas a one standard deviation increase in the misalignment in the market has a significant effect (amounting to -3 percentage points) and its impact remains persistent over

the next 15 quarters. These findings and insights highlight the usefulness of the at-risk framework to assess and track the evolution of downside risks to the CRE market over time. In this way, the framework forms an important element of systemic risk identification and assessment for the CRE market.

Figure 10 shows how actual CRE growth, expected CRE growth (median percentile) and 5th percentile tail risk from the CRE at-risk model evolve over time. It is noteworthy that actual CRE growth is more volatile than the expected growth series forecast by the model. However the model does pick up these valuation fluctuations at a small lag and follows actual growth quite closely. The CRE at-risk series captures tail events quite well also, as happened during the global financial crisis of 2008 where actual growth amounted to a tail event and was anticipated by the T+4Q tail risk forecast which closely matches actual growth experienced at that time. The equivalent series for the T+12Q series are included in the Appendix B. Actual CRE growth annualised over a 3 year period during the financial crisis was so adverse it fell below the 5th percentile growth forecasts.

In Appendix B, we present the decomposition of the CRE growth-at-risk series according to the relevant contributions from each of the model's input variables, as outlined earlier. Their respective impacts vary over time, with the global financial crisis shown to be a clear turning point. In the pre financial crisis period, past CRE growth was reducing tail risk, which was mainly driven by the build-up of credit and misalignment in the market (see Schularick and Taylor, 2012) as well as financial conditions (ICSI). With the onset of the global financial crisis, tighter financial conditions and weaker ex-post CRE growth rates increased downside risks. The current low level of the misalignment index contributes to a slight reduction in the 5th percentile of Ireland's estimated CRE growth distribution. The factors that drive the CRE growth vary across different forecast horizons. Financial conditions have only a short-term impact and are less persistent over the three year horizon. The country fixed effects variable (FE), is currently the most important variable weighing against Ireland's CRE growth risk in both the one-year and the three-year ahead forecasts. While an assessment of the factors driving the fixed effect variable are beyond the scope of this *Note*, future research can seek to examine these features in more detail.

4 Scenario analysis – the potential impact of structural changes on the Dublin office market

While the time series analysis presented to this point provides a useful framework to assess recent cyclical developments within the Irish commercial property market, the occurrence of significant structural change, exacerbated by the COVID-19 shock, presents challenges for time-series analytical methods. To inform a more comprehensive assessment of the risks and vulnerabilities that could arise from such significant structural adjustments, the above time series analysis is complemented in this section with a scenario analysis under which a range of possible market outcomes are considered.

As highlighted in Section 2, the COVID-19 shock has already had a notable impact on CRE capital values and rents since 2020Q1 and further embedded structural trends that had been slowly emerging in recent years. While statistical indicators provided no clear evidence of CRE value misalignment before the onset of the shock, the nature of the structural change in the CRE market has the potential to alter the dynamics of the CRE market and the indicators used to measure price misalignments.

Looking ahead, a key determinant for the outlook of the CRE market in Ireland is the impact of significant structural change on some parts of the market, such as the greater adoption of remote working amongst office-based employees and employers, the largest of Ireland's traditional commercial property sectors.[17] While the long-term effects of the COVID-19 shock on the office

[17] Since 2010 for instance, the office sector has accounted for about two thirds of the CRE portfolio, by value, upon which MSCI's commercial property capital value and rent indices are based.

sector remains highly uncertain, changes to the uses and layout of the "traditional" office and increased rates of working from home are expected to be part of its legacy. For instance, recent survey evidence, from multiple sources, points to the willingness of both employees and employers to formalise and substantially increase current working from home policies in the aftermath of the pandemic (Figure 11).

To assess the potential impact of these changes on the office sector, this section outlines and presents the results of a scenario analysis, with three potential outcomes for the Dublin office vacancy rate over the period 2021 to 2023. The outcome of each scenario is determined by the set of assumptions made to key factors likely to influence the availability of office space in the near term. The key assumptions focus on the supply pipeline, the volume of office leases expiring / up for renewal, increased rates of working from home by employees and the repurposing of office space to take account of social distancing requirements / change of layout.

The "central" scenario is based, in so far as possible, on assumptions supported by current market data and publically available information although it is important to recognise the high degree of uncertainty that exists in office markets worldwide given recent unprecedented events. To take account of this elevated uncertainty, a number of scenarios are presented to illustrate the range of possible outcomes that could occur depending on changes to the underlying assumptions. It is also important to highlight that the pandemic is ongoing and the impact of the COVID-19 shock is still feeding through to the CRE market. This is particularly the case for the structural changes mentioned above which may take a number of years to be fully reflected in market dynamics. Illustrating the range of possible outcomes, the "central" scenario is accompanied by a "less severe" scenario, where the underlying assumptions are more-benign and a "more severe" scenario where the underlying assumptions are more adverse compared to the central scenario.

At the end of 2020, it is estimated that the Dublin office market consists of approximately 4 million square metres of space, of which more than 3.6 million square metres is occupied by an estimated 355,000 employees.[18] As shown in Figure 3, this results in a vacancy rate of more than 9 per cent. The specific pipeline, lease and working from home assumptions underlying the "central", "less severe" and "more severe" scenario outcomes are detailed in Annex C and include:

I. The first assumption pertains to the amount of Dublin office space that is expected to be delivered in the next few years. As of May 2021, market participants estimate that a total of almost 770,000 square metres additional office stock will be delivered to the market by end 2023. At present, about 70, 45 and 10 per cent of the space due to be delivered in 2021, 2022 and 2023 respectively is already pre-let, with the remaining portion still vacant. The assumption underlying the "central" scenario is that the present uncertainty will result in the breakdown of space taken-up across the three years being closer to 80, 60, and 40 per cent of the current pipeline (see Table in Appendix C). Under the "less severe" scenario some additional space is occupied, resulting in a take-up of 90, 70 and 50. A breakdown of 70, 50 and 30 per cent of the respective annual pipeline is assumed to be occupied under the "more severe" scenario. A depreciation rate of 1.5 per cent of outstanding stock is also assumed across the board (Annex C).

II. The second assumption relates to lease expiration/renewal, and is centred on data from the Office for Public Works (OPW) (see Hayes, 2020), which show that approximately 30 per cent of leases attached to the Dublin office space rented by the public sector is up for renewal over the coming three years.[19] Since an equivalent figure for the private sector is not publically available, the "central" scenario assumes that a similar figure applies to the private sector, i.e. cumulatively about 30 per cent of Dublin office space will be due for renewal before the end of 2023. Given the large uncertainty around this assumption, the alternative "less severe" scenario, assumes that this figure is 10 per cent smaller than the

[18] For details on the calculation of these estimates see Box 1 of Savills (2019).
[19] See Hayes (2020).

central scenario. The "more severe" scenario meanwhile is based on a 10 per cent greater rate of lease expiration during the period under review.

III. The next assumption concerns the post-pandemic working from home landscape and is based the findings of a range of surveys on this issue, conducted amongst both employees and employers asked about pre and post COVID-19 working arrangements. Flexibility appears to be highly valued when it comes to working from home intentions, with working from home taking place on a full-time, several times weekly, several times monthly or less frequent/occasional basis, or indeed, never at all. For this exercise, five different working from home surveys were reviewed and the shares of employees opting for each of the aforementioned working arrangements were calculated.[20] Therefore, the central assumption is calculated as the average percentage of respondents across the five surveys in each working from home category (i.e. daily, weekly, monthly, occasionally and never). On this basis, it is taken that fulltime working from home is 5 days a week (i.e. 100 per cent of the time), several times a week is 3.5 days a week (i.e. 70 per cent of the time), several times a month is 1.5 days a week or 6 days a month (i.e. 30 per cent of the time), occasionally is one day a month (i.e. 5 per cent of the time) and never is 0 days (0 per cent of the time).

   It is also important to note that some level of working from home existed before the pandemic and was accounted for in the vacancy rate. Therefore, the post-pandemic working from home figure used in these calculations is the difference between the pre-COVID-19 working from home figures and the post-COVID-19 intended working from home figures. In addition it is important to highlight that the rise in working from home will only affect the space covered by the leases that are expiring / up for renewal (see previous assumption) and so the working from home figures are only applied to this segment of the market, rather than the sector as a whole. Where leases are not up for renewal, their working from home plans and potential impact on the vacancy rate are not considered since they are tied to an existing lease.

   The "more severe" scenario is based on the average findings across two working from home surveys by NUI Galway and the Western Development Commission (see McCarthy, et al. 2021) and Barrero et al. (2021) which finds a relatively high share of employees planning to work from home full-time after the pandemic (Figure 11). The "less severe" scenario is based on the findings of a Cushman and Wakefield / CoreNet Global (2021) survey where the results suggest that while more firms are likely to adopt working from home practices, a comparatively higher share of companies are likely to do so on a hybrid or part-time, rather than on a daily basis (Figure 11).

IV. The final assumption aims to take account of the market and occupier reaction to the disruption brought about by the COVID-19 pandemic. For instance, continued social distancing protocols could see a requirement for an increase in the typical amount of space assigned to individual employees or extensions to canteen, meeting room or training facilities. Similarly, changes to commuting practices and preferences, for example a rise in the numbers walking, running or cycling to work will require the assignment of additional space for changing rooms and shower facilities.

   The central scenario assumes no change in the volume of space per employee in 2021, before an additional 0.5 square metres (sq. m) per worker is added by 2022, rising to an extra 1 (sq. m) per employee by 2023. In the "less severe" scenario, employees are assigned 0.75 (sq. m) more space on average in 2022 and 1.25 (sq. m) in 2023. The equivalent figures applied under the "more severe" scenario are 0.25 and 0.75 (sq. m), respectively. The repurposing of space in this manner should, all else being equal, serve to moderate the

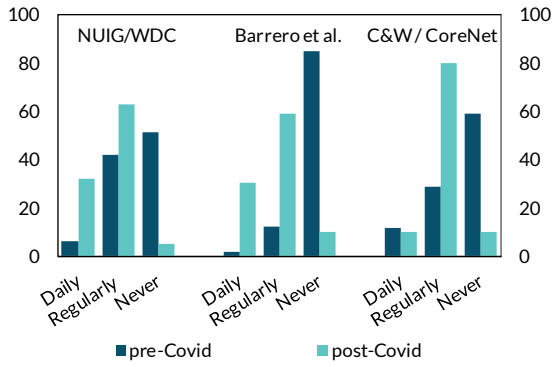
[20] Working from home surveys include Aon and Sigmar (2021), Barrero et al. (2021), CBRE (2020), McCarthy et al. (2021), and Cushman and Wakefield / CoreNet Global (2021).

possible increases in the vacancy rate as a result of some of the structural changes discussed above.

The outcomes of the three scenarios, in terms of projected Dublin office vacancy rates are presented in Figure 12. Under the "central scenario", the vacancy rate rises from over 9 per cent in 2020, to almost 12 per cent at the end of 2021, before stabilising at around 11 per cent in 2022 and 2023 as space vacated due to increased levels of working from home is repurposed for alternative uses. After a slight increase in the Dublin office vacancy rate during 2021, the dynamics of the "less severe" assumptions see a fall back in the vacancy rate towards pre-pandemic levels occurring in the following two years. By contrast, the "more severe" set of assumptions would potentially lead to a the vacancy rate continuing to rise over the next few years as the envisaged alterations to office layouts are not enough to offset the excess vacant space arising from such high instances of remote working.

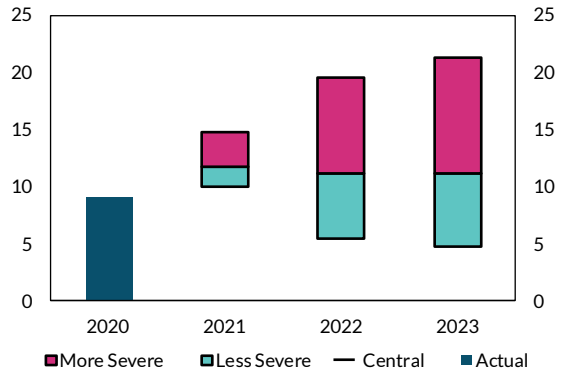
Of course, these are mechanical scenarios based on assumptions – which are extremely uncertain. But they illustrate how sensitive developments in the office segment can be to more persistent shifts in behaviour stemming from the pandemic. And what happens to vacancy rates would also have implications for the paths of rents and capital values (Figure 13). However, it is important to acknowledge the significant changes which have occurred in Ireland's commercial property landscape over the past decade, as laid out in Section 2. Moreover, it is clear from the indicator of CRE price misalignment, as shown in Figure 4, that any current deviation of Irish commercial property capital values from what one would expect is far below the levels recorded in the run up to the 2008 global financial crisis and the collapse of the domestic property market.

Figure 11: Pre-COVID 19 working from home practices and post-COVID 19 working from home intentions – selected surveys (per cent)



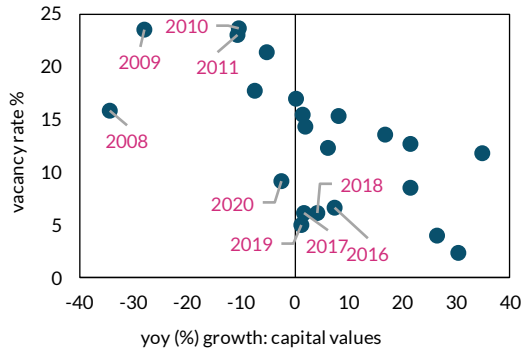
Source: Authors' calculations based on survey results from a number of recent WFH studies. NUIG/ WDC survey results presented in McCarthy et al. (2021). "Regularly" includes those opting to WFH on a hybrid basis, i.e. more frequently than never and less frequently than daily.

Figure 12: Scenario analysis examining structural changes arising from COVID-19 shock: Potential Dublin office market vacancy rates (per cent)



Source: Authors' calculations based on initial (i.e. 2020) data from CBRE.

Figure 13: Dublin office annual capital growth and vacancy rates (1999 to 2020)



Source: Authors' calculations based on data from CBRE and MSCI.

5 Conclusions

The CRE market is important to monitor from a financial stability perspective given its size and systemic interlinkages to the real economy and with the wider financial system. A substantial fall in CRE prices would likely have negative implications for the real economy through knock-on collateral, wealth, investment and employment effects. Understanding the impact of the COVID-19 shock on the CRE market is therefore crucial to inform systemic risk assessments. This *Note* documents the initial impact of the COVID-19 shock on the CRE market in Ireland. The market, in particular the retail sector, has already experienced downward adjustments in valuations. We highlight that components of the CRE market such as the retail and office sectors that are particularly vulnerable to both near-term and structural implications of COVID-19 including the rise of e-retailing and increased working from home.

We draw on a number of analytical approaches, including a simple forecasting model to assess the potential outlook for the CRE market. Moreover, we extend the growth-at-risk framework to assess the potential downside risks to the outlook for the CRE market in Ireland. Using a scenario analysis, we document the potential impact of working from home practices may have on office vacancy rates under a number of differing assumptions. As noted above, this analysis is based on mechanical scenarios based on assumptions – which are extremely uncertain and potentially subject to change. However, they nevertheless illustrate how sensitive developments in the office segment can be to more persistent shifts in behaviour stemming from the pandemic. And what happens to vacancy rates would also have potential implications for the paths of rents and capital values. However, it is also important to acknowledge the significant changes which have occurred in Ireland's commercial property landscape over the past decade, as laid out in Section 2. Moreover, it is clear from the indicator of CRE price misalignment, as shown in Figure 4, that any current deviation of Irish commercial property capital values from what one would expect is far below the levels recorded in the run up to the 2008 global financial crisis and the collapse of the domestic property market.

Looking ahead, the analytical approaches such as the growth-at-risk framework can be extended to examine the changing structure of the CRE market over the last decade, and in particular, the importance of foreign institutional investment intermediated via Irish resident investment funds. Ongoing enhancements to the at-risk framework could also include an assessment of macroprudential policy effectiveness, in terms of mitigating tail risk without adversely affecting median or "expected" growth outcomes. The development of the CRE-at-risk framework also allows for a benchmarking of adverse scenarios that can inform regular systemic risk surveillance exercises and assessments, as presented in the Central Bank of Ireland's Financial Stability Reviews.

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Appendix A: Additional details on CRE forecasting model

We assess CRE price dynamics through the lense of a vector-error correction model (VECM). This estimation method allows us to model processes that are characterised by dynamic fluctuations around a persistent long-term trend and therefore have been put forward to model variables with a high degree of stickiness. The cointegrating relationship embedded in the VECM has two important benefits: firstly, it has been shown to improve the forecasting performance with respect to other simple time series models (see Gattini and Hiebert (2010)). Secondly, the error correction term can be derived from the long-run relationship contained in the cointegrating vector. This measure is commonly interpreted as a measure of deviation from fundamental prices (see e.g. Panagiotidis and Printzis (2015)).

The VECM model is described by the following equation:

$$\Delta y_t = \alpha\beta' y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta y_{t-1} + v + \epsilon_t \text{ , with } y_t = [CV_t, RV_t, Emp_t, Yields_t]$$

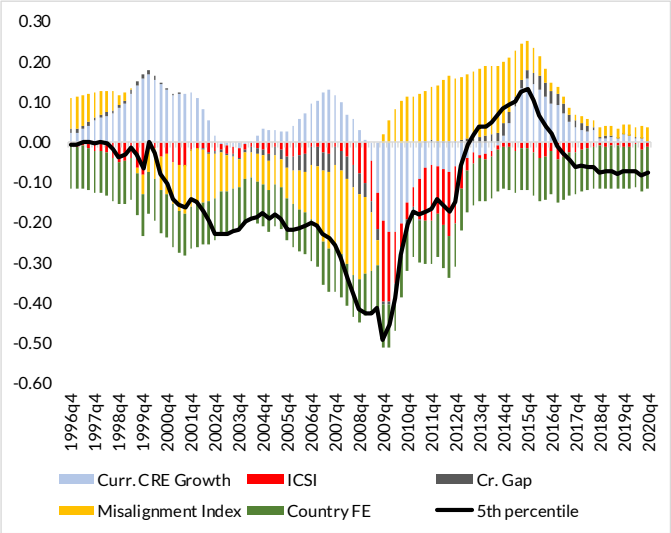
Where y_t is a four-dimensional vector of observable variables[21], α is a set of short-run adjustment coefficients, β is the cointegration matrix, ϵ_t is a vector of error disturbances, v represents a constant trend, $\alpha\ \beta' y_{t-1}$ the models error correction component and Γ_i are a set of autoregressive coefficient matrices.

We select a lag order (p) of 2 based on the FPE, AIC, HQIC and SBIC selection order criteria and a rank number of 1 as suggested by the Johansen test. Through this set-up we are able to explain a large share of the variation in the CRE price dynamics (R-squared 0.80).

[21] *CV* stands for commercial property capital values, *RV* stands for commercial property rental values, *EMP* represents employment and *Yields* denotes CRE yields.

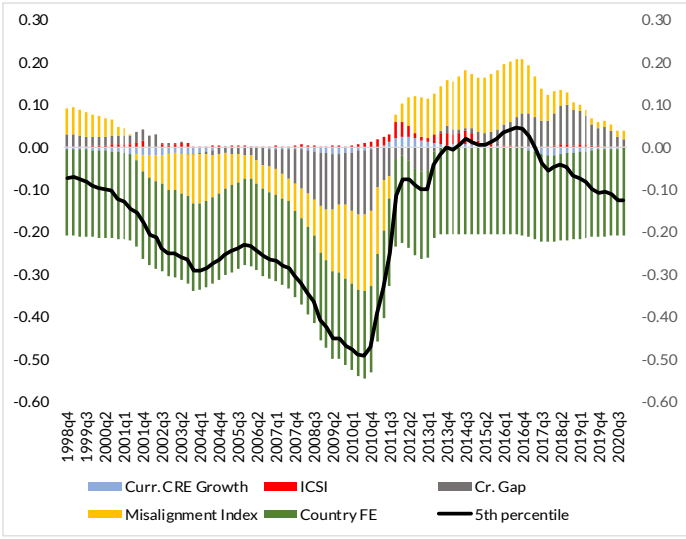
Appendix B: Decomposition charts for at-risk framework

Figure 14: CRE at Risk – Factor Decomposition (T+4Q)



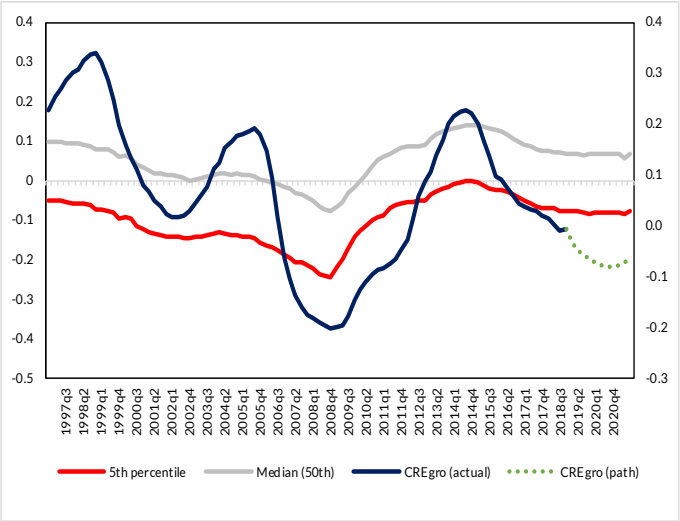
Source: Central Bank of Ireland
Note: Decomposition of contribution by explanatory data to the 5th percentile CRE growth in Ireland through time. Forecasts are T+4Q ahead, last observation 2020Q3.

Figure 15: CRE at Risk – Factor Decomposition (T+12Q)



Source: Central Bank of Ireland
Note: Decomposition of contribution by explanatory data to the 5th percentile CRE growth in Ireland through time. Forecasts are T+12Q ahead, last observation 2020Q3.

Figure 16: CRE actual growth compared with T+12Q expected and "at risk" growth rates



Source: Central Bank of Ireland
Note: T+12Q forecasts of CRE growth at the median and 5th percentile (CRE at risk) levels. Actual 3 year annualised growth also shown. Last observation 2020Q3 with CRE growth forecast from model described in Section 3.1 shown in green.

Appendix C: Assumptions for commercial property market scenario analysis

	Less Severe Scenario			Central Scenario			More Severe Scenario		
Pipeline Assumption	**2021**	**2022**	**2023**	**2021**	**2022**	**2023**	**2021**	**2022**	**2023**
Pipeline of new stock (m2)	203,697	201,390	363,611	203,697	201,390	363,611	203,697	201,390	363,611
of which.....	**90/70/50**			**80/60/40**			**70/50/30**		
Pre-let (%)	90	70	50	80	60	40	70	50	30
Vacant (%)	10	30	50	20	40	60	30	50	70
Depreciation (as a % of tot. stock)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Resultant vacancy rate (%)	*7.8*	*7.5*	*9.6*	*8.3*	*8.5*	*11.3*	*8.8*	*9.4*	*12.9*
Lease Assumption									
Lease re-negotiations (% cumulative)	***10% less space up for renewal***			***current situation***			***10% more space up for renewal***		
OPW rate (as a % of tot. stock)	10	21	26	11	23	29	12	26	32
WFH Assumption									
Working from home assumptions (%)	***Cushman & Wakefield / CoreNet Global****			***average 5 across surveys***			***avge across NUIG/WDC & Barrero et al.***		
difference in % share of workforce expected to WFH post-COVID-19									
Daily (*lease renewals*WFH(%)*100%*)	N/C	N/C	N/C	13.7	13.7	13.7	26.9	27	27
Several times a week (*lease renewals*WFH(%)*70%*)	18	18	18	18.7	18.7	18.7	32.9	33	33
Several times a month (*lease renewals*WFH(%)*30%*)	36	36	36	22.4	22.4	22.4	12.0	12	12
Occasionally (*lease renewals*WFH(%)*5%*)	N/C	N/C	N/C	- 4.4	- 4.4	- 4.4	-11.1	-11	-11
Resultant vacancy rate (%)	10.0	12.1	15.1	11.7	15.6	19.7	14.8	21.8	27.5
Additional space requirements/space repurposing due to CV-19 (per worker)	-	+0.75 sqm	+1.25sqm	-	+0.5 sqm	+1sqm	-	+0.25 sqm	+0.75sqm
Resultant vacancy rate (%)	**10.0**	**5.5**	**4.7**	**11.7**	**11.1**	**11.1**	**14.8**	**19.6**	**21.3**

Source: Authors' calculations and assumptions based on data from a number of sources including CBRE (for pipeline of new stock), details of various studies on working from home (see footnote 20 for details of the relevant surveys used), Hayes (2020) (for lease expiration information and associated assumptions), Savills (2019) (for space per worker). * Some rounding of figures from Cushman & Wakefield / CoreNet Global (2021) survey has been added.

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