

A Regional Indicator of Commercial Real Estate Activity: The KC Fed CRE Index

By Nicholas Sly and Bethany Greene

Although community leaders and policymakers are attentive to developments in commercial real estate (CRE) within their regions, tracking the ebbs and flows of the wide span of activities in the sector can be challenging. At their inception, commercial properties involve construction activity, land development, and local infrastructure investments. These properties are then used for retail shops, hotels, office spaces, multifamily housing, or industrial production, forming a close connection between cash flows within the CRE sector and broader economic activity. Moreover, commercial properties are long-lived assets that generally require significant up-front financial investment and often change ownership during their useful lives. These features create a tight link between CRE activity and financial conditions, evident for both community banks and broader financial markets. The breadth of these connections highlights both the importance and difficulty of tracking developments in the CRE sector.

Although broad in its makeup and reach, CRE often reflects the regional economic landscape more than it is shaped by national features. The need for industrial space versus office space, for example, depends entirely on the makeup of the regional economy. Likewise, proximity to airports or travel destinations motivates investments in hotels and retail, while population density and the pace of regional development drive demand for multifamily housing separate from national trends. Even

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the distinction between the most sought-after Class A office properties versus other Class B office properties has more to do with the economic geographies within cities than aggregate conditions. Community and regional banking organizations tend to have high CRE loan concentrations, further tightening the regional connections to the sector.

Recognizing both the broad connections and regional drivers of the CRE sector, in this article we introduce a new indicator of regional CRE activity: the Kansas City Fed CRE Index. This index encompasses a broad range of related economic activities and financial considerations based on timely survey responses received from market participants across the Tenth Federal Reserve District—a seven-state region that includes Colorado, Kansas, Nebraska, Oklahoma, Wyoming, and portions of Missouri and New Mexico. We demonstrate that the CRE index can capture regional trends in CRE activity, offer insight about future growth in construction employment, provide a leading indicator of CRE loan performance, and reveal the drivers of developments in the sector in a timely manner.

Section I describes various aspects of the CRE sector important to capture in the index. Section II details specific measures of CRE activity, describes our methodology for combining these indicators into a single index, introduces a measure of signal quality to indicate the salience of changes in the index amid other economic noise, and demonstrates how changes in the index are attributed to specific market drivers. Section III looks beyond the CRE sector and highlights the link between the index and related economic activities.

I. Key Aspects of Regional CRE Activity

The CRE sector is composed of distinct segments based on property types, such as office, retail, or industrial. Each of these property types has its own subsegments: for example, industrial properties can include data centers, factories, and warehouses. Despite these differences, changes in prices and quantities in CRE markets can reveal comparable information about overall conditions across disparate segments of the sector. These market characteristics can be summarized by five key features: prices for existing CRE space, the availability of existing CRE space, new construction and development of CRE space, construction

costs and materials prices for new CRE space, and financial conditions. Although these characteristics can be measured in different ways, each is critical to include in any holistic assessment of conditions in the CRE sector.

Prices for existing CRE space

Commercial properties have several observable prices that reflect conditions in the sector. The first relevant price for existing CRE properties is the rent tenants pay to occupy certain properties (or, equivalently, the cash flow received by property owners from a portion of their asset). Adjacent to the rent paid to the property owner is the rental price for subleased space, when allowable. A second relevant price is the transaction price, or valuation, of a commercial property in its entirety. Although any property valuation is linked to the cash flow it earns, rental prices and property valuations have independent drivers. For example, shifts in local property tax legislation may alter market valuations of properties independent of rental prices, while changes in demand among long-term or anchor tenants may affect prevailing rental rates independent of those tax policies.

Availability of existing CRE space

The share of available commercial space in a market is typically summarized by the vacancy rate for local properties of a certain type. Equivalently, market vacancy rates are related to the share of existing commercial space in a market currently being leased and producing cash flow for property owners.¹ Because of this link between vacancy rates and operating incomes, the vacancy rate is closely connected the market price for properties during transactions. The amount of available commercial space within a market at any point in time varies with the flow of tenants into and out of properties. The net absorption rate is an additional market characteristic that describes this flow.

New construction and development of CRE space

Depending on the property type, the construction and development of commercial space can take considerable time. Thus, the amount of CRE becoming available at a given point—also known as

the completion rate—is a timely indicator of changes in the amount of commercial space that is currently available. This rate can be highly variable. Delays during construction can occur due to myriad factors, and some properties do not need to be fully completed before they can be partially occupied, potentially accelerating the rate that available space comes online.

The amount of construction underway is also a good indicator of future commercial spaces in a regional market. Market participants across the CRE sector are forward-looking because of both long construction lags and the long-lived nature of commercial assets. As a result, shifts in the amount of construction underway can affect current business strategies, even though breaking ground on new property development may not affect the amount of commercial space available for months or years.

New construction costs and materials prices for CRE space

The prices for materials, building equipment, and construction labor can all be important factors in the decision to develop new commercial space, even though these costs may shift throughout development. Expectations about these costs may determine whether a new commercial building project pencils out. These costs also vary regionally and over business cycles in ways that can be important to track.

Financial conditions

Finally, financial conditions are tightly linked to CRE activity. Commercial properties tend to be long-lived assets, change ownership throughout their useful lives, and require significant up-front costs to develop, renovate, or modernize. The cash flows of commercial properties are driven by unknown future economic conditions, with risks to property owners and lenders. These financial risks are managed among investor portfolios in recognition of prevailing financial conditions. The availability of credit, capital requirements or other lending standards, and the cost of capital influence nearly every aspect of the CRE sector. These financial considerations may vary regionally based on nearby economic trends and the risk appetites of local financial institutions.

II. Constructing an Aggregate CRE Index for the Tenth District

Recognizing the difficulty in tracking the wide span of activities, property types, and economic developments within the CRE sector, we combine specific measures of the market characteristics described in the previous section to construct a single index that characterizes regional conditions in the CRE sector. The KC Fed CRE Index will be updated and published on the Federal Reserve Bank of Kansas City website on a quarterly basis to provide timely information about regional developments in CRE market conditions.

Variables and sources

We use the KC Fed Beige Book surveys as our data source for all variables included in the index. Formal surveys with consistent questions of various respondents from across the Tenth Federal Reserve District have been running since 2006. Business contacts from CRE companies, construction supply companies, and CRE lenders at banking institutions answer surveys eight times a year, a few weeks in advance of Federal Open Market Committee (FOMC) meetings. We combine the eight yearly sets of responses into three-month periods of observation to yield a quarterly indicator for each variable. Historically, the qualitative responses in the Beige Book have been shown to be good predictors of quantitative measures of aggregate economic activity (see, for example, Balke and Petersen 2002).

Rather than providing a quantitative measure of market characteristics, survey respondents indicate if each market variable is increasing, staying the same, or decreasing. Respondents are asked to assess each aspect of their business's current CRE activity relative to their activity (or expectations for activity) one month ago, one year ago, and three months in the future.² The number of respondents ranges from 45 to 60 per survey. Respondents represent all states in the Tenth District and vary significantly in their size (that is, market share), market segment (such as retail or office), market scope (local, regional, or national), and position in the industry (lenders, builders, property managers, and owners). Given the many questions, multiple time frames, and two surveys that run each quarter, the total number of quarterly responses

(observations) is typically around 1,000. Table 1 summarizes the survey variables included in the KC Fed CRE index. A full description of the survey questions is available in the appendix.

Combining variables into an index of regional CRE activity

The KC Fed CRE Index is meant both to capture changes in regional CRE activity and to combine the various aspects of CRE activities and market segments into a single summary measure. Toward these aims, we create the index in two steps. As a first step, we summarize changes in regional CRE metrics at each point in time by aggregating the set of responses to each survey question to a single diffusion index for each variable.³ The diffusion indexes take on values of -100 to 100 , with values above 0 indicating that more respondents view activity for a specific variable as increasing. More extreme values of the diffusion indexes do not necessarily indicate bigger changes in conditions (intensive margin) but rather that more respondents reported similar changes in conditions (extensive margin).

Despite the CRE sector's range of activities, property types, and economic drivers, the variables in our index tend to move together on average, suggesting that overall CRE conditions in the region can be summarized by common factors. The co-movement in observed CRE market characteristics is evident in Chart 1, which displays the correlation coefficient between each pair of variables from 2006:Q3 to 2023:Q3. Darker shades indicate stronger positive correlations between pairs of variables over time. The average correlation coefficient is 0.66 , indicating the various aspects of regional CRE activity move together, but imperfectly. For example, improvements in CRE lending conditions reported by bankers tend to move in tandem with improvements in property sales and transaction prices reported by CRE property managers.

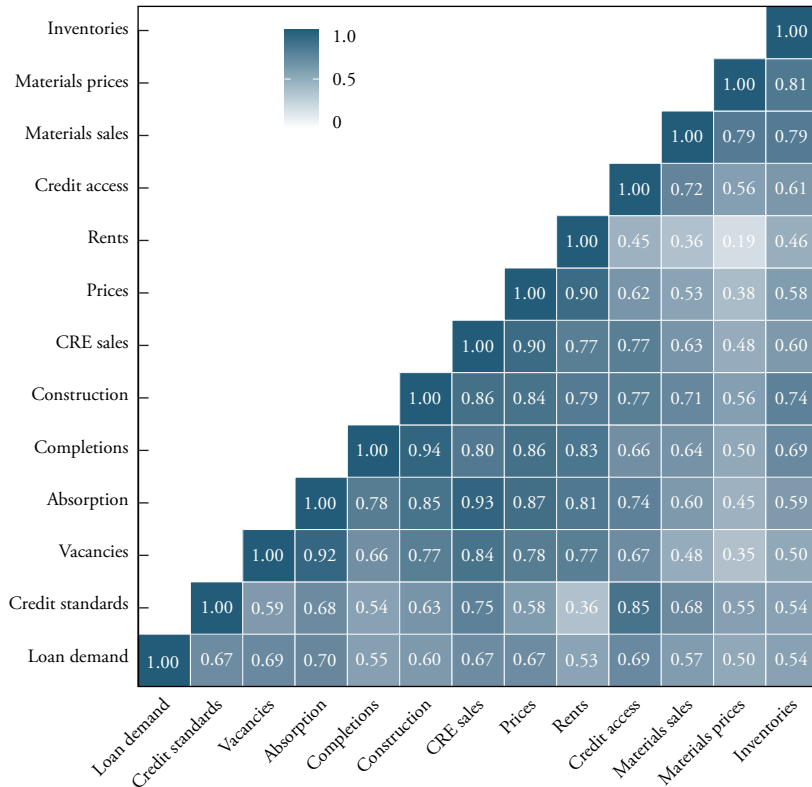
As a second step, we summarize and track changes in Tenth District CRE conditions by determining the common factor that explains as much of the co-movement in regional CRE market characteristics as possible. To do so, we use the method of principal components.⁴ Table 2 shows the coefficients for each variable corresponding to the first factor used to construct the CRE index, estimated using the span of observations from 2006:Q3 to 2023:Q3. The estimated coefficients range from 0.071 for construction selling prices to 0.140 for construction underway. When estimating the principal components, we standardize

Table 1
Metrics and Survey Sources for Variables Included in the KC Fed CRE Index

Survey question	Market feature	Respondent
Demand for CRE loans	Financial conditions	Bank
Credit standards for CRE loans	Financial conditions	Bank
CRE vacancy rates	Availability of CRE space	CRE firm
CRE absorption	Availability of CRE space	CRE firm
CRE completions	New construction of CRE space	CRE firm
CRE construction underway	New construction of CRE space	CRE firm
CRE property sales	Financial conditions	CRE firm
CRE transaction prices	Prices of available CRE space	CRE firm
CRE rents	Prices of available CRE space	CRE firm
CRE developers' access to credit	Financial conditions	CRE firm
Construction materials sales	New construction of CRE space	Construction company
Construction materials prices	Building costs and materials prices	Construction company
Construction materials inventories	New construction of CRE space	Construction company

Source: Federal Reserve Bank of Kansas City.

Chart 1
Correlation Coefficients for Variables Included in KC Fed CRE Index



Notes: The average correlation coefficient is 0.66. The diffusion index for vacancy rates is reported inversely, so that lower vacancy rates correlate positively with the other market characteristics shown.
 Sources: Federal Reserve Bank of Kansas City and authors' calculations.

Table 2

Estimated Coefficients for KC Fed CRE Index Variables

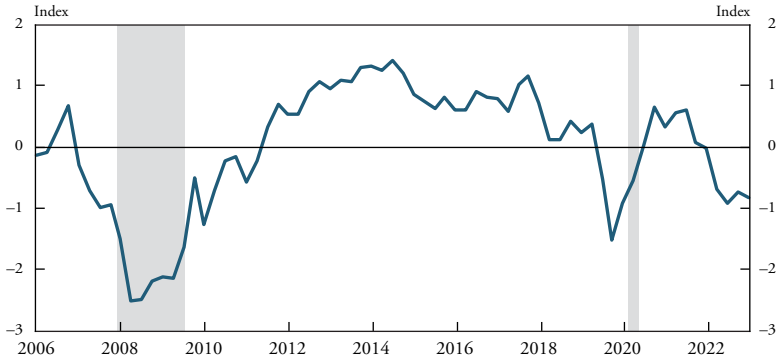
Variable	Coefficient
Demand for CRE loans	0.0857
Credit standards for CRE loans	0.0861
CRE vacancy rates	0.0937
CRE absorption	0.1029
CRE completions	0.0977
CRE construction underway	0.1040
CRE sales	0.1037
CRE prices	0.0988
CRE rents	0.0861
CRE developers' access to credit	0.0935
Construction materials sales	0.0860
Construction materials selling prices	0.0711
Construction materials inventories	0.0855
Share of variation explained by first factor	69.3 percent

Note: Coefficient values correspond to first principal component analysis factor estimated for the period 2006:Q3–2023:Q3.

Sources: Federal Reserve Bank of Kansas City and authors' calculations.

each diffusion index corresponding to the CRE activity variables so that the coefficients from the principal components estimation indicate the change in the overall index that results from a one-standard-deviation increase in the corresponding variable's diffusion index. We calculate the value of the CRE index at each point in time by multiplying these estimated coefficients by the observed values of the corresponding variable for each quarter and then summing across all variables. The numerical values of the index are weighted so that they reflect the difference between current conditions and historical norms in terms of the number of standard deviations away from the average set of responses observed over the entire sample period. A value of zero indicates conditions are in line with the historical average.

Altogether, the first principal component explains 69.3 percent of the total variation in regional CRE activity reported by business contacts during the sample period. Chart 2 plots the KC Fed CRE Index. As expected, the value of the index drops precipitously during the 2007–08 global financial crisis. The value of the index begins to rise in 2009 but does not normalize for several years, consistent with the slow recovery following a period of financial instability. The value of the index remains elevated through the longest expansion on record for the U.S. economy, before collapsing in 2020 at the onset of the

*Chart 2***A Regional Indicator of Commercial Real Estate Activity:
The KC Fed CRE Index**

Note: Gray bars indicate National Bureau of Economic Research (NBER)-defined recessions.

Sources: Federal Reserve Bank of Kansas City, NBER (Haver Analytics), and authors' calculations.

COVID-19 pandemic. The index recovers much more quickly from the pandemic than from the financial crisis, consistent with the relative lack of financial instability prior to the pandemic and the extent of monetary and fiscal support for the recovery.⁵

Measuring signal quality and specific drivers in survey responses

As discussed previously, the KC Fed CRE Index explains approximately 69 percent of the observed variation in reported conditions across CRE market characteristics in the Tenth District from 2006 to 2023. This performance suggests the CRE index captures the sector's economic developments well on average. However, the utility of the index as a timely indicator of activity depends on the extent to which current changes in the index provide “novel” or “surprising” economic information at a given point in time as well as how well the index captures differences in the drivers of CRE conditions across cycles at different points in time.

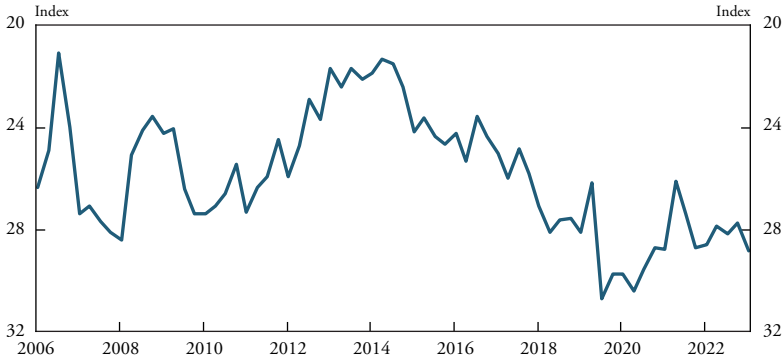
A useful companion to the CRE index is a measure of the *amount* of information, or signal quality, associated with the set of observed CRE market characteristics. The signal quality of the index is challenged by two potential concerns: ambiguity in the measures of each CRE market characteristic reported by survey respondents and heterogeneity in reports of conditions in the CRE market (that is, mixed reports)

among survey respondents or across market conditions. A well-known feature of the diffusion indexes used to characterize the various aspects of CRE activity is that they do not report unique values for different market conditions. For example, if 60 respondents were all to report “no change” in a certain market characteristic—or if 20 respondents were to report that characteristic “increased,” while 20 indicated “no change” and 20 indicated “decreasing”—both sets of responses would return a diffusion index value of zero. However, the signal quality of these responses differs. The former case, where all respondents indicated the same market conditions, contains more information than the latter case, where respondents’ reports were more mixed. Besides the ambiguity in measured changes in market conditions, the outlooks for certain CRE variables or market participants may move in different directions at certain points in time. Whether due to ambiguity in how regional CRE market metrics are moving or observed differences in how they are moving, the overall signal quality of the CRE index can vary over time.

Chart 3 illustrates a measure of signal quality for changes in the CRE index for a given point in time.⁶ During periods of stronger signal quality—such as the three-year span from 2013 to 2016—respondents from CRE developers, property managers, and lenders all generally reported the same conditions for the sector. Notably, the value of the KC Fed CRE Index shown in Chart 2 changes little throughout this period when respondents generally agreed conditions were favorable in the CRE sector. However, during periods of relatively low signal quality—such as the early years of the recovery following the global financial crisis or following the years of the COVID-19 pandemic—the conditions reported by market participants were more mixed.

Besides the overall signal quality of the index during specific periods, the drivers of market conditions vary over time in ways that are important to capture. Economic cycles tend to be characterized by “this time is different” narratives, with unique drivers of downturns and recoveries, and also tend to be asymmetric, with short periods of rapid contraction followed by long periods of moderate expansion. A key feature of the KC Fed CRE Index is the ability to delineate the factors driving CRE conditions during seemingly noisy periods or dynamic periods when conditions are changing.

One such example is the rapid lead-up to and long, anemic recovery from the global financial crisis. Prior to the global financial crisis,

*Chart 3***Signal Quality from CRE Surveys Varies, Falling When Responses Are Mixed**

Note: Values of signal quality are shown inverted as higher measures of Shannon entropy indicate more mixed responses and less signal quality.

Sources: Federal Reserve Bank of Kansas City and authors' calculations.

financing for land development was common. After 2010, however, lenders eschewed such activity—both because these loans are more difficult to collateralize and because they faced more uncertainty about future credit performance. Perhaps most importantly, supervisory attention and capital requirements around commercial land development increased significantly coming out of the global financial crisis. These shifts changed the nature of banks' CRE loan books from one cycle to the next (Bassett and Marsh 2017). During the period following the global financial crisis, several of the largest drivers of the recovery in the CRE index were improvements in market metrics such as vacancy rates, absorption rates, and construction. Although CRE loan demand improved as conditions for property owners and managers became more favorable, lending standards did not. The slow recovery in CRE financial conditions is not surprising, as the global financial crisis hit these aspects of the CRE sector hardest.

More recently, the main factors pushing the CRE index down beginning in 2022 were not CRE market metrics, but rather declining loan demand, tightening lending standards, and developers' difficulty accessing credit. Financial conditions tightened significantly during 2022 and 2023 as the Federal Reserve raised interest rates and reduced the size of its balance sheet. Moreover, the rise in interest rates was swift and came on the heels of a prolonged low-rate environment that left a footprint on banks' loan portfolios. The financial factors driving the

index down in recent years differ significantly from the real CRE market drivers of the index a decade earlier in a way that is captured by the methodology used to construct the KC Fed CRE Index.

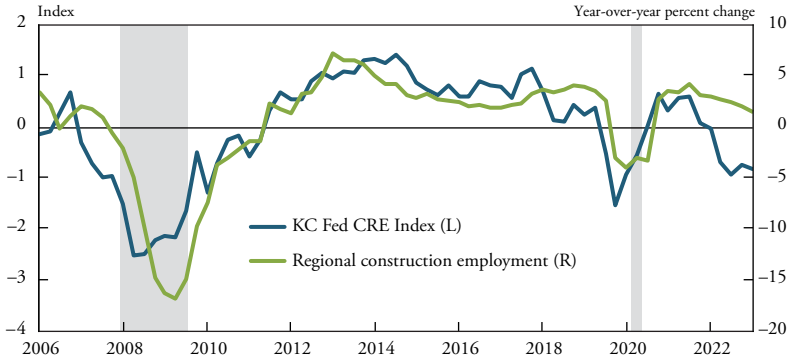
III. Link between the KC Fed CRE Index and Related Economic Activity

Changes in regional CRE activity captured by the KC Fed CRE Index can shed light on changes in other related economic outcomes. In particular, CRE activity is tightly connected to two broader economic conditions: regional construction employment and loan performance at regional banks.

Ebbs and flows in commercial real estate development activity tend to result in changes in demand for construction labor. Chart 4 shows this close connection between the CRE index and construction employment over time. Specifically, it shows that movements in the index (blue line) tend to lead changes in regional construction employment (green line) two to four quarters ahead.⁷ The forward-looking nature of the survey responses included in the CRE index may provide an early indicator of how the demand for workers will fluctuate six to 12 months in the future.

The most recent values of the index are declining, suggesting a looming headwind to construction employment for the region. However, the signal quality of the index is relatively low in recent quarters, as reports about changes in conditions were mixed across respondents and market segments. A simple regression analysis reveals that while declines in the level of the index portend declines in construction employment, the predicted fall in employment is more modest when signal quality is low.⁸ Given the mixed signals coming from regional CRE contacts recently, any declines in construction employment over coming quarters may be less steep than the recent declines in the index suggest.

In addition to construction employment, CRE activity may help predict loan performance at regional banks. Community and regional banking institutions tend to hold a relatively large share of CRE loans and securities on their balance sheet.⁹ Monitoring the performance of these loans on banks' balance sheets is therefore a critical aspect

*Chart 4***The KC Fed CRE Index Leads Regional Construction Employment**

Notes: Gray bars indicate NBER-defined recessions. Regional construction employment is measured for the seven states that are part of the Tenth Federal Reserve District: CO, KS, MO, NE, NM, OK, and WY.
Sources: Federal Reserve Bank of Kansas City, NBER (Haver Analytics), U.S. Bureau of Labor Statistics (Haver Analytics), and authors' calculations.

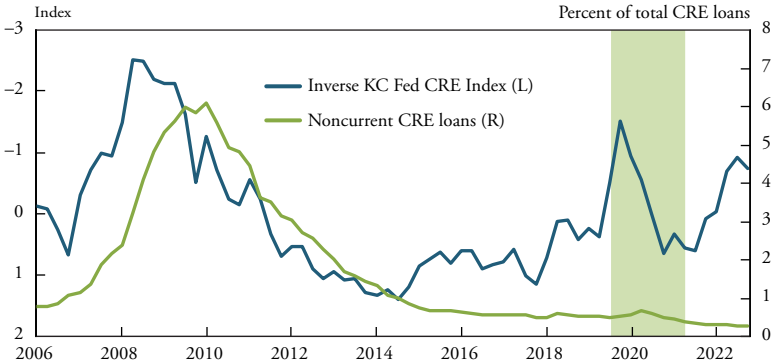
of maintaining safety and soundness. Panel A of Chart 5 shows that changes in the CRE index tend to lead changes in the share of CRE loans that are noncurrent by three to six months.¹⁰ Note that the values of the CRE index are inverted in Chart 5, since a rise in the share of noncurrent loans represents a deterioration in conditions. The global financial crisis was a significant outlier in the volume of CRE loans that were noncurrent, making changes in later periods difficult to see in Panel A due to base effects. To address these base effects, Panel B plots the annual percentage change in the share of CRE loans that are noncurrent and shows that the CRE index tends to track the changes in CRE loan performance even outside the large swings observed between 2007 and 2009.

Panel A of Chart 5 also shows that while CRE conditions deteriorated quickly during the first half of 2020, the share of noncurrent CRE loans did not rise as much. Interagency guidance issued at the time largely accounts for this.¹¹ Financial institutions were allowed, and even encouraged, to determine the nonaccrual status or loan modifications based on the facts and circumstances of individual borrowers, as conditions early in the pandemic were highly uncertain.¹² However, the

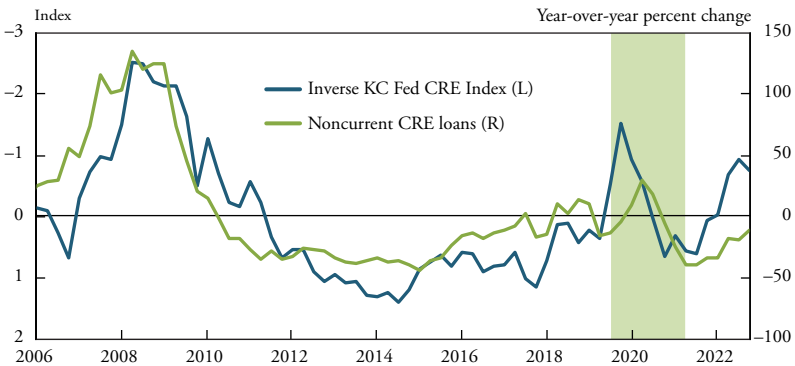
Chart 5

KC Fed CRE Index Leads Changes in CRE Loan Performance

Panel A: Share of Total Noncurrent CRE Loans



Panel B: Annual Change in Share of Noncurrent CRE Loans



Note: The shaded green region over the 2020–21 time span corresponds to the period during which interagency regulatory guidance influenced the manner in which CRE loans were modified, and noncurrent statuses were determined according to the specific facts and circumstances individual borrowers faced during the early phase of the pandemic. Sources: Federal Reserve Bank of Kansas City, FDIC, and authors’ calculations.

most recent declines in the index are more likely to exhibit the typical relationship with CRE credit performance, given that the temporary regulatory guidance set early in the pandemic no longer applies. If so, the current level of the KC Fed CRE Index suggests that nonaccruals and past-due levels for CRE loans are poised to rise in coming months. Given the reliance of many banks in the Tenth District on CRE lending, rising stress in the CRE sector could be a salient challenge.¹³

Conclusion

Tracking the diverse and dynamic CRE sector in a timely manner can be challenging, but the KC Fed CRE Index summarizes a variety of changes in regional CRE conditions with only minimal lags. Changes in the KC Fed CRE Index can help business leaders and policymakers to forecast changes in regional construction employment and CRE loan performance. Furthermore, the index can also identify the factors driving changes in commercial real estate activity that may differ from one business cycle to another.

Looking ahead, several structural shifts are occurring within the CRE sector. Workplace habits have changed, altering the use of office and retail spaces and the geography of economic activity within cities. Supply chains for many industries are being reforged, altering the needs for warehouses and industrial space across locations. The KC Fed CRE Index may be a useful tool for tracking these developments in a timely manner and delineating the drivers of CRE activity amid these structural shifts.

Endnotes

¹ Leased commercial spaces are occasionally unoccupied, in which case the tenant leasing the property still owes rent on space not currently being used. The occupancy rate is an additional market statistic often thought to be a forward-looking indicator of the vacancy rate for a given market. However, this statistic is not captured in the KC Fed surveys and thus is not included in the construction of the KC Fed CRE Index.

² Survey respondents are not asked about forward expectations for a small number of market characteristics related to lending activity. Appendix Table A-1 specifies the time frames addressed for each question.

³ For expositional and analytical simplicity, the diffusion index for each question is a simple composite of responses for all three time frames: activity relative to one month ago, activity relative to one year ago, and activity relative to respondents' expectations for three months in the future. We obtain similar results when constructing the index with the time frames separated, so that none of our results or insights are affected by this simplifying assumption.

⁴ Formally, the principal component analysis estimation procedure is as follows. Let x_{it} be the observed value of the i^{th} standardized variable in quarter t ; let a_1, \dots, a_{13} be a set of coefficients for the $K=13$ variables; define CRE_t to be the value of the CRE index in quarter t ; and let T be the total number of quarters observed. The values $\{CRE_t\}$ and the coefficients $\{a_k\}$ for all K variables and T periods are chosen to minimize the sum of squared errors, $SSE = \sum_K \sum_T (x_{kt} - a_k CRE_t)^2$, subject to the constraint $\sum_T CRE_t^2 / (T - 1) = 1$. The coefficients a_1, \dots, a_{13} are then weighted by the first eigenvalue of the variance matrix.

⁵ Berger and Demirguc-Kunt (2021) provide more details on the conditions of the financial sector and real economy through the pandemic. They describe the "twin surprises" of no banking crisis and a robust real recovery that were predicated on strong bank capitalizations going into the pandemic and the robust fiscal and monetary support on the way out.

⁶ We formally measure signal quality by Shannon entropy across all variables and respondents. Shannon entropy for the individual observed responses, x_{it} , from the set of all potential responses across all questions and respondents, X_t , at time t , denoted as $H(X_t)$, is calculated as $H(X_t) = -\sum_{x_{it} \in X_t} p(x_{it}) \log_3 p(x_{it})$. The log base of 3 is chosen to reflect the three potential responses to each question corresponding to each metric: increasing, decreasing, or staying the same. In this context, the relative amount of information between observation periods is the relevant statistic, rather than the absolute level of information to be stored or measured. Thus, the choice of log base is irrelevant, as no meaning is attributed to the unit of measure of entropy.

⁷To be more precise, the KC Fed CRE Index is a significant predictor of changes in construction employment in the sense that a Granger causality test shows the CRE index improves predictive models of employment dynamics (with a p-value < 0.01 for all models with lags between one and four quarters), but that employment dynamics do not improve predictive models of the CRE index at any horizon.

⁸Specifically, a regression of regional construction employment on a one-quarter lag of the index, measured entropy, and their interaction, reveals a negative and significant coefficient on the interaction term (p-value < 0.05), implying the predicted positive change in employment corresponding to an increase in the index is smaller when entropy is high, and vice versa.

⁹See Hanauer and others (2021) and Kandrac and Marsh (forthcoming) for more discussion of community and regional banks' CRE holdings.

¹⁰Similar to the analysis of construction employment, a standard Granger causality test for any model up to one year ahead shows that the CRE index is a significant predictor of CRE loan performance for Tenth District banks.

¹¹See, for example, the interagency guidance on loan modifications from April 2020 (Board of Governors of the Federal Reserve System 2020a).

¹²More information about these developments can be found in the supervisory and regulatory FAQs related to COVID-19 (Board of Governors of the Federal Reserve System 2020b). See Glancy, Kurtzman, and Loewenstein (2022) for the extent to which banks modified CRE loans during this period.

¹³Cole and White (2012), Friend, Glenos, and Nichols (2013), and the FDIC (1997) provide detailed historical perspectives on the link between CRE loan performance and the regional and community banking system.

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Appendix Variable Definitions

Table A-1
Variables Included in the KC Fed CRE Index

Market feature	Observed variable	Responses	Time frames	Respondent
Prices of available CRE space	Rent prices	Up, down, or no change	Past 30 days, year ago, next three months	CRE firm
	Transaction prices	Up, down, or no change	Past 30 days, year ago, next three months	CRE firm
Availability of CRE space	Vacancy rate	Up, down, or no change	Past 30 days, year ago, next three months	CRE firm
	Absorption rate	Up, down, or no change	Past 30 days, year ago, next three months	CRE firm
New construction of CRE space	Completions	Up, down, or no change	Past 30 days, year ago, next three months	CRE firm
	Construction underway	Up, down, or no change	Past 30 days, year ago, next three months	CRE firm
	Construction materials sales	Up, down, or no change	Past 30 days, year ago, next three months	Construction company
	Construction materials inventories	Up, down, or no change	Past 30 days, year ago, next three months	Construction company
Construction costs and materials prices	Construction materials prices	Up, down, or no change	Past 30 days, year ago, next three months	Construction company
Financial conditions	Demand for CRE loans reported by bankers	Substantially stronger, moderate stronger, about the same, moderately weaker, substantially weaker	Past 30 days	Bank
	Banks' CRE credit standards	Tightened considerably, tightened somewhat, basically unchanged, eased somewhat, eased considerably	Past 30 days	Bank
	CRE developers' reported access to credit	Harder, same, or easier	Past 30 days, year ago, next three months	Construction company
	Property sales	Up, down, or no change	Past 30 days, year ago, next three months	CRE firm