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How did the interest rate risk influence the German real estate economy?

Abstract

The German residential real estate market has thrived in recent decades, driven by low-interest rates, demand and supply factors. However, concerns arise about the impact of changing interest rates. This paper explores the nature of interest rate risk and its effects on the German real estate market. Interest rate risk, affecting instruments and portfolios, extends to residential real estate. Interest rate changes can affect mortgage costs, influencing demand and prices. It can alter investors' decisions and project development. While the effects of interest rate risk can lead to market changes, they are not expected to cause a collapse. The market's stability is not immune to interest rate risk, as research suggests an 11% overvaluation. Understanding the interplay between interest rate risk and the German real estate market is vital for risk management. Demographic trends, regional differences, and the market's ability to manage interest rate risk are key factors in its future. In conclusion, this paper underscores the intricate relationship between interest rate risk and the German residential real estate market, emphasising the need for ongoing research to gauge the market's vulnerability to changing interest rates and demographic shifts. Such analyses will provide a more comprehensive understanding of how interest rate risk influences real estate pricing and market dynamics.

Key words

Interest rates, Interest rate risk, Real estate, Real estate market, Residential real estate, Risk management

JEL Classification

E4, G32, R3

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Introduction

The aim of this contribution is to work out to what extent interest rate risk affects the German residential real estate market. Real estate is difficult to compare with normal goods because of its location-specific nature, which makes the valuation and development of real estate prices more complex (Bull, 2020). Phases of a real estate boom are always accompanied by attractive financing conditions and interest rates (Gischer & Weiß, 2007). Conversely, existing real estate booms are slowed or ended by a deterioration in interest rate conditions. A good example of this is the United Kingdom at the end of the 1990s and the beginning of the 2000s. One experienced a long real estate boom that was eventually slowed down by interest rate hikes and warnings from international economic organisations (Gischer & Weiß, 2007). A change in interest rates was thus partly responsible for the end of the real estate boom in the UK – at that time. The so-called interest rate risk thus made its appearance here and lived up to its name.

If one looks at the development of the German real estate market over the past two decades, massive price increases that persisted over a very long period quickly become apparent (Budde & Micheli, 2013). This was favoured, among other things, by the historically long-lasting low-interest phase. The question that many experts have been asking for some years now is how prices in Germany will develop further once the low-interest phase ends and a change in interest rates occurs. What will happen to the German real estate market if the interest rate risk, which is essential for banks and other financial institutions (Alessandri & Drehmann, 2010), becomes reality?

This paper examines the impact of interest rate risk on the German real estate market. The aim is to understand the impact of interest rate changes on financial instruments, financial institutions and households. The development of the real estate market in Germany since 2000 is analysed and its stability compared to other countries is examined. In addition, the specific impact of interest rate risk on real estate prices, demand and investment behaviour is highlighted. The paper identifies potential risks and opportunities for various actors and examines the macroeconomic implications. Overall, it aims to provide a comprehensive understanding of the relationship between interest rate changes and the German real estate market.

This study has shed detailed light on the interactions between the German real estate market and interest rate risk. As a result of this analysis, several crucial findings were obtained. First, the historical stability of the German real estate market was confirmed compared with other countries. Despite isolated speculative price developments, especially in metropolitan areas, the market remained comparatively resilient to macroeconomic shocks and turbulence. Second, interest rate risk has been identified as a key factor influencing the real estate market. A change in interest rates can have a significant impact on the financing costs of real estate purchases. An increase in interest rates can lead to higher monthly payments and thus reduced demand for real estate, while lower interest rates can boost demand. Third, banks and financial institutions, because of their large portfolios of fixed-income securities, have been found to be particularly vulnerable to interest rate risk. A change in interest rates can significantly affect their financial condition and net margins. Fourth, it has been shown that interest rate risk not only affects demand and prices in the real estate market, but also has an impact on investment decisions by market participants. When interest rates rise, investors tend to withdraw their capital from the real estate market and redirect it to higher-yielding investments. Finally, it was pointed out that there are regional differences in the development of the German real estate market. While urban centers with positive employment prospects saw price increases, shrinking regions saw lower demand. Interest rate risk could exacerbate these regional differences. In summary, interest rate risk plays a significant role in the German real estate market and affects various market players. The findings provide valuable insights into the complexity of this relationship and serve as a basis for further research and the development of risk management strategies.

In this academic paper, we will first take a closer look at the nature of interest rate risk and its implications. In addition, the relevant aspects of the German real estate market development from the past two decades will be listed. The focus is exclusively on the development of residential real estate prices. Following the explanation of the two topics, the acute interest rate risk for the German real estate market will be evaluated on the basis of various literary works and historical crises. The literature currently focuses primarily on interest rate risk with respect to banks (Alessandri & Drehmann, 2010; Entrop et al., 2008) or small business (Vickery, 2008). In this context, the state of knowledge on a link between interest rate risk and the real estate market is less developed. The summary and conclusion of this paper also discusses in more detail what further research on this topic might look like and what developments can be expected as a result of the interest rate change that took place in 2022.

1 The interest rate risk

Interest rate risk refers to the risk that interest rates in the market may change, thereby adversely affecting the performance of financial instruments, such as bonds or loans, with respect to portfolio risk (Piepelow, 1991). It usually arises due to the fact that the value of bonds and other fixed income instruments is inversely correlated with interest rates. When interest rates rise, this leads to a loss in value of existing bonds with lower interest coupons compared to current market rates (Piepelow, 1991). Various definitions in the literature differ widely on this topic. For example, these definitions can be divided into stock-oriented definitions (statistical approaches) and fixed-interest risk-oriented approaches (Piepelow, 1991). Other authors rather speak of a value approach or a cash flow approach (English, 2002). In this paper, we rather work with a fixed interest rate risk oriented approach.

However, interest rate risk does not only affect bonds, but can also have an impact on other financial products, such as loans, mortgages and derivative instruments. Institutions such as banks and insurance companies are particularly vulnerable to interest rate risk, as they often hold large portfolios of fixed-income securities. Looking more closely at the bank, a bank's interest rate risk reflects the extent to which its financial condition is affected by changes in market interest rates (English, 2002). Banks with riskier loans and higher interest rate risk tend to set lending and deposit rates to achieve higher net interest margins. In this context, commercial banks' net interest margins are affected by both default risk and interest rate risk premia (Angbazo, 1997).

However, interest rate risk is not identical for every bank, in every country. Various studies have already shown that there are differences in the level of interest rate risk across countries (Madura & Zarruk, 1995). This fact suggests that capturing differences in interest rate risk is important in setting risk-based capital requirements for international banks (Madura & Zarruk, 1995). Moreover, this also underscores the point that both domestic and international interest rates must be considered when assessing the risk profiles of banks from different countries (Madura & Zarruk, 1995). It should be added at this point that there are differences in interest rate risk across banks of different sizes and banking groups (Entrop et al., 2008).

However, interest rate risk is not only important for banks and other financial institutions. For example, households are also strongly affected by interest rate risk (Van Hemert, 2010). A study by Van Hemert analyzed the way households manage interest rate risk using a life-cycle asset allocation model that takes into account mortgage and bond portfolio choices. The research showed that the majority of investors prefer adjustable-rate mortgages because they can save the bond risk premium associated with fixed-rate mortgage payments (Van Hemert, 2010).

Over the past decades, banks and regulators have already spent a great deal of time and effort developing systems to monitor and manage interest rate risk (English, 2002). If appropriate measures are not taken for interest rate risk, the consequences can be significant. Examples include the secondary banking crisis in the United Kingdom in the 1970s and the sharp decline in net interest margin at U.S. savings banks in the early 1980s, when interest rates rose to historic highs (English, 2002).

In general, banks earn returns for their shareholders by accepting and managing risk, including the risk of loan defaults or changes in interest rates that can narrow the interest rate spread between assets and liabilities (Wright & Houpt, 1996). Historically, loan defaults have caused the largest losses for commercial banks, while interest rate spreads have remained relatively stable even during periods of high interest rate volatility (Wright & Houpt, 1996). In contrast, a 2018 study showed that bank stock prices decline following an unanticipated increase in interest rates or steepening of the yield curve (English et al., 2018). This subsequently leads to problems for banks and their shareholders.

2 The German real estate market

This chapter takes a look at the development of the German real estate market since 2000. The focus is exclusively on the German residential real estate market. When real estate prices change, especially when they rise, this has a major impact on the different strata of the population and their purchasing power (Bull, 2020). This is because (residential) real estate markets have a major impact on the economy, price levels and financial market stability. They affect aggregate demand and also influence the credit decisions of private households (Gischer & Weiß, 2007). Real estate prices are influenced by demand-side and supply-side factors. Demand-side factors include, for example, demographic trends, household structures, economic conditions and preferences (Westermeier & Grabka, 2017). Supply-side factors, on the other hand, include, for example, construction activity, availability of building land, prices in surrounding regions, infrastructure development and housing equality (Westermeier & Grabka, 2017).

Various studies assume a declining population in many regions of Germany (Westermeier & Grabka, 2017; Bräuninger & Otto, 2006; Zabel, 2022). As a consequence, this would also affect the real estate market, as a lower number of buyers would also lead to a lower amount of demand. This would force real estate prices to fall. In shrinking regions in particular, the problem exists anyway that existing residential properties cannot be marketed sufficiently due to a lack of demand (Zabel, 2002). Accordingly, it becomes necessary to develop options for action in order to be able to guarantee the long-term marketability of the corresponding residential properties in shrinking regions.

In general, however, real estate prices in Germany have first risen massively in recent years. This also applies to residential real estate. Reasons for this are, for example, the robust economic development, the low interest rate level (until 2022), protection against inflation (even low inflation can no longer be detected in Germany in 2023) and immigration (Budde & Micheli, 2013). Even during the 2008 financial crisis, the German real estate market shone with stability, although transaction volumes were very volatile from 2005 onwards (Just & Maennig, 2017). Due to this stability, risk-averse national and international investors started to invest in almost all German real estate classes (Just & Maennig, 2017).

Back to real estate price increases. Urban centers with good employment prospects are particularly affected by price increases, which have a positive impact on disposable incomes and purchasing power (Budde & Micheli, 2013): Speculative real estate price developments entail considerable risks in this context and have been a recurring topic in Germany in past debates (Kholodilin et al., 2014). Concerns about speculative exaggerations are mostly based on experiences in other countries such as the United States or Spain (Kholodilin et al., 2014).

Until around 2010, the German regional housing market is said to have experienced price developments in line with economic developments. In the following six years, however, price developments were increasingly driven by supply shortages and rising demand, especially in large cities (Dahl & Goralczyk, 2017). Asylum seekers, of which around 890,000 arrived in Germany in 2015, leading to a population growth of around 1.00%, also increased demand for affordable housing in the short to medium term (Dahl & Goralczyk, 2017).

In Berlin, for example, the development of rent prices for apartments in recent years led to a rent cap, which, however, was already declared unconstitutional by the Federal Constitutional Court on April 15, 2021, as the competence to legislate in rent price law lies with the federal government and not with the city or state of Berlin (Arlia et al., 2022). Accordingly, the rent cap lasted only one year (introduced on February 23, 2020)(Arlia et al., 2022). However, this experiment illustrates that real estate prices in Germany have developed so strongly in recent years that such measures have been demanded by parts of the population. Such real estate price development was favored by a historically long-lasting low interest rate environment. However, the low interest rate environment disappeared into thin air last year and there is no sign of it in 2023 either. Currently, interest rates for real estate financing in Germany are around 3.42% with a fixed borrowing rate of 10 years (Dr. Klein Privatkunden AG, 2023). At the same time last year, for example, interest rates were “only” around 2.52% with a fixed borrowing rate of 10 years (Dr. Klein Privatkunden AG, 2023). So the question at this point is, what risks do changes in interest rates pose for the German residential real estate market?

3 How did the interest rate risk influence the real estate economy in Germany?

The particular stability of the German housing market compared with other countries is repeatedly highlighted in the literature by various authors (Voigtländer, 2013). In the 2000s, there were cycles of excessive boom and bust in the housing market. However, not all countries experienced high volatility in house prices. Germany was characterized by stable prices throughout this period, which did not react to macroeconomic shocks (Voigtländer, 2013). This stability is often justified by real estate financing and the existence of a sophisticated rental market. While in other countries monetary policy stimulus is effectively passed on to the real economy through the housing market, the German emphasis on prudent lending insulates the housing market from distortions in financial markets (Voigtländer, 2013). This finding by Voigtländer indicates at first glance that a change in interest rates should not pose a serious risk to the German residential real estate market, as real estate financing policies already deal with this issue cautiously.

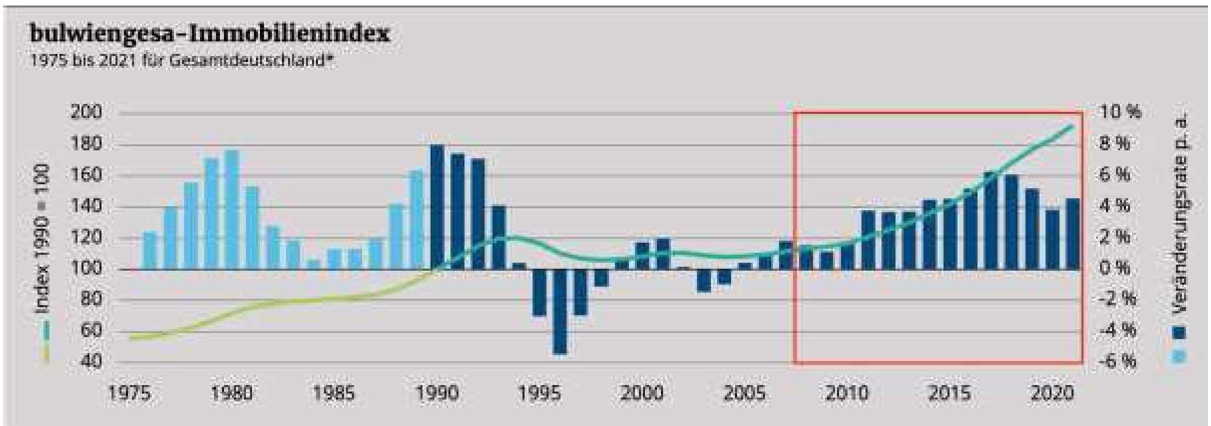
From 2014 to 2019, real estate prices in Germany rose significantly faster than consumer prices, with the exception of a single quarter. As a result, concerns have arisen about excessive overheating of the real estate market (Hertrich, 2019). An empirical application during this data period subsequently outlined that the German real estate market is overvalued by about 11%. The main factors that have driven this imbalance have been identified as interest rate risk and a relatively advanced stage of the real estate cycle, while a solid debt servicing capacity has mitigated these imbalances since late 2009 (Hertrich, 2019). Taking a closer look at these facts, it becomes clear that despite the “stabile lending” of the German banking sector, interest rate risk (among other factors) has led to an 11% overvaluation as of 2019. Accordingly, prudent handling of the interest rate issue is not sufficient to cushion serious consequences of the interest rate risk.

Real estate derivatives represent a special case in this regard. Although real estate markets account for a large share of developed countries’ total assets, real estate derivatives markets often lag behind in terms of trading volume and liquidity (Fabozzi et al., 2009). The 2000s also saw increasing activity in the development of derivative instruments that can be used by asset managers to manage real estate risk (Fabozzi et al., 2009). Some experts speak of a fundamental stability that cannot be shaken by a change in interest rates (Voigtländer, 2013), and others have spoken of regionally overheated prices for many years (Hertrich, 2019). The question now is specifically what influences interest rate risk can have on the German residential real estate market exactly and who these effects will hit particularly hard. Interest rate risk in general can have a significant impact on affected market participants (Sweeney & Warga, 1986). A change in interest rates directly affects the cost of mortgage loans. When interest rates rise, monthly payments on existing and new loans become more expensive as a result. This may discourage potential buyers from purchasing real estate because financing costs increase. It can also lead to a decline in demand for real estate, which in turn affects the real estate market.

In addition, interest rate risk can also have a direct impact on real estate prices (Chaney & Hoesli, 2010). If interest rates rise, many potential buyers may be discouraged from purchasing real estate because monthly payments would be higher. This could also lead to a decrease in demand for real estate, which in turn could lead to a decrease in real estate prices. On the other hand, falling interest rates may increase demand for real estate and lead to rising prices. Thus, interest rate risk can also have positive effects in the real estate context if interest rates change in the "right" direction. For example, if we look at the real estate boom in the early 2000s and previous years, it was accompanied by strong credit growth among households (Gischer & Weiß, 2007). Accordingly, when interest rates are good, this often leads to a real estate boom. Conversely, however, it also leads to stronger household debt.

In this context, it makes sense to look at the development of real estate prices in Germany after the global economic crisis of 2008. A continuous price increase can be clearly seen here. The more interest rates have fallen in the same period, the more real estate prices have risen. The following chart also illustrates this observation:

Figure No. 1: Development of the real estate index since 2008 according to bulwiengesa



Source: bulwiengesa AG (2022).
Translation: bulwiengesa-Immobilienindex = bulwiengesa real estate index; 1975 bis 2021 für Gesamtdeutschland = 1975 to 2021 for All of Germany; Veränderungsrate p.a. = Rate of change p.a.

bulwiengesa is an independent market research company that has been analyzing the German real estate market for over 45 years and compiles an annual price index. Year after year, it has identified price increases and also regular record values. In order to determine specifically how strongly interest rate changes will affect property prices in Germany, the rate of price increases between 2022 and 2023 can be calculated. The following equation can be used to determine the rate of price increases.

(1) $P = (VPI2 / VPI1 - 1) * 100$

Data from immowelt.de was used to determine the price increase rate. Immowelt is the second largest German online platform for real estate listings for rent and purchase. It is important to note that the data used are the asking prices for residential properties for sale. While positive price increase rates were recorded every year in previous years, the rate of change from 2022 to 2023 is negative again for the first time. After analysing all 401 districts in Germany, the following average can be determined for the 16 German federal states:

Table No. 1: Price rate change of the 16 German federal states

Federal state	Rate of price change (2022 → 2023)
Baden-Wuerttemberg	-5,66%
Bavaria	-5,10%
Berlin	-2,04%
Brandenburg	-5,02%
Bremen	-8,46%
Hamburg	-8,59%
Hesse	-4,70%
Lower Saxony	-5,88%
Mecklenburg-Western Pomerania	-1,49%
North Rhine-Westphalia	-4,57%
Rhineland-Palatinate	-1,85%
Saarland	3,80%
Saxony	-1,68%
Saxony-Anhalt	1,08%
Schleswig-Holstein	-9,10%
Thuringia	3,45%

Source: Author’s calculation based on data from immowelt.de (2023)

As can be seen from the table, the massive rise in interest rates has had an initial dampening effect on real estate prices and in this sense illustrates the relevance of interest rate risk for the German real estate market. It should be emphasised that the change in interest rates has led to a fall in prices in 13 of the 16 German federal states. Only in Saarland, Saxony-Anhalt and Thuringia did prices continue to rise. Nevertheless, the price increases here are also significantly lower than in previous years. At this point, it is questionable whether this negative trend will continue if interest rates remain constant and whether a correction in market prices can be assumed.

Moreover, interest rate risk can and should also influence investors' investment decisions (Chaney & Hoesli, 2010). When interest rates rise, investors may tend to withdraw their money from the real estate market and divert it to other types of investments in higher yields. This could be particularly significant for institutional investors in real estate, such as insurance companies and pension funds (Chaney & Hoesli, 2010). As a result, this could lead to a reduction in the volume of investment in the real estate market. However, the impact of interest rate risk is not only relevant for existing properties, but also for those that are still being developed. Interest rate risk can also have an impact on project development (Reed, 2021). If interest rates rise, financing costs for project developers may increase, which could affect the profitability of real estate projects. This could lead to a reduction in the number of new construction projects, limiting the supply of real estate. Given the existing construction backlog of almost 850,000 apartments (Federal Institute for Research on Building, Urban Affairs and Spatial Development (original name: "Bundesinstitut für Bau-, Stadt- und Raumforschung"), 2022), such an impact of the interest rate risk would be fatal.

It therefore remains to be noted that interest rate risk can have various effects on the residential real estate market and its participants. In general, however, it should also be noted that the effects cannot cause a market collapse. Rather, they are consequences that can lead to an increase or decrease in demand, supply and prices. Accordingly, there may be greater changes in market events. However, one should not expect a collapse as a result. At this point, the German real estate market has already proven its stability in various crises. In general, however, an accurate measurement of interest rate risk is of great importance for appropriate risk management (Sweeney & Warga, 1986). For example, one can measure interest rate risk with duration analysis. This measure is also recommended to banks in part as part of their risk management to reliably measure and manage their interest rate risk and maximize their long-term profits (Sweeney & Warga, 1986).

But the real estate market, and in particular its housing prices, can also have a major impact on monetary policy decision making and implications for economic activity and price developments the other way around. In the 2000s, for example, the sharp rise in house prices in the United States was the starting point of the debate on real estate markets and their influence on interest rate decisions (Gischer & Weiß, 2007). The bursting of the price bubble in the U.S. housing market at that time led to global financial market turmoil and subsequently to the global economic crisis. Thus, the macroeconomic relevance of real estate markets became clear

(Gischer & Weiß, 2007). It is therefore questionable whether real estate prices have a stronger influence on a change in interest rates than the other way around.

Conclusion and Outlook

Now that the nature of interest rate risk, the development of the German residential real estate market and the interplay between these two aspects have been discussed in detail, this summary is intended to highlight the key points once again and provide an assessment of how the German real estate market could develop in the coming years.

Interest rate risk can have a significant impact in various areas. It plays a major role for banks (Alessandri & Drehmann, 2010), small businesses (Vickery, 2008) and also for the real estate market and its market participants (Sweeney & Warga, 1986). In the introduction to the topic, it was already pointed out that real estate is difficult to compare with other goods due to its location-specific nature and that the valuation and development of real estate prices is therefore complex (Bull, 2020). Real estate booms are often accompanied by attractive financing terms and interest rates, and changes in interest rates can influence the real estate boom in the process (Gischer & Weiß, 2007). The end of the real estate boom in the United Kingdom also coincided with a deterioration in interest rate conditions.

Interest rate risk refers to a possible change in interest rates on the market and the associated - possible - negative performance of financial instruments, which can affect portfolio risk (Piepelow, 1991). In this context, interest rate risk affects not only bonds but also other financial products such as loans and mortgages. Banks and other financial institutions are particularly vulnerable to interest rate risk (English, 2002), but households are also affected by interest rate risk (Van Hemert, 2010). In recent years and decades, banks and regulators have already spent considerable time and effort developing systems to monitor and manage interest rate risk (English, 2002).

Boosted by the prolonged period of low interest rates, the German real estate market and its prices for residential property have risen sharply over the past two decades (Budde & Micheli, 2013). Especially in metropolitan areas with good employment prospects, real estate price increases are clearly noticeable (Budde & Micheli, 2013). Based on such observations, various experts repeatedly point to the speculative exaggerations that have been observed in other countries in the recent past (Kholodilin et al., 2014).

The objectives of this study as formulated in the introduction were carefully examined in the course of the work. The main objective was to understand and quantify the impact of interest rate risk on the German real estate market. This research has shown that interest rate risk does indeed have a significant impact on the real estate market in Germany, both on prices and on demand. It has been confirmed that changes in interest rates have a significant impact on the financing costs of real estate purchases and the investment decisions of market participants. In this sense, it was concluded that the first objective of this study was successfully achieved. Another objective was to analyse the stability of the German real estate market in comparison with other countries. The results have shown that the German real estate market has indeed been historically more stable than many other markets. Despite speculative price developments and regional differences, it has been able to withstand macroeconomic shocks and turbulence. This confirms that the stability of the market is a remarkable feature.

Finally, the objective was to identify potential risks and opportunities for different players in the real estate market and to analyse the macroeconomic impact of interest rate changes. The research findings suggest that banks, financial institutions, households, and investors are all affected by interest rate risk to varying degrees. This allows risk management strategies to be developed and the impact of interest rate changes to be better understood. In summary, this study has successfully achieved the objectives set out in the introduction. It has provided valuable insights into the relationship between interest rate changes and the German real estate market and offers a basis for further research in this area. Moreover, it has underscored the urgency of effective risk management for market participants and the importance of maintaining the stability of the real estate market in Germany.

The question now, however, is where these observations might lead in the future. Based on the information presented, there is an end to the low interest phase. The German real estate market has benefited from the historically low interest phase over the past decades. An end to this phase and a change in interest rates could have an impact on real estate prices. If interest rates rise, this could lead to an increase in financing costs and affect demand for real estate. The vulnerability of banks and other financial institutions could also cause problems. As mentioned previously, banks and other financial institutions are particularly vulnerable to interest rate risk. A change in interest rates can affect their financial condition and net interest margins. Accordingly, an increase in interest rates could lead to problems for banks and their shareholders.

In addition, regional differences must not be ignored when considering possible future problems. The German real estate market has developed very differently from region to region. While there have been strong price increases in conurbations with good employment prospects, there are already problems marketing residential properties in shrinking regions. A change in interest rates could reinforce these regional differences. Speculative price developments and possible exaggerations have already been a regular topic of various debates and publications in recent years. Concerns about such exaggerations are mostly based on experiences in other countries. A change in interest rates could have an impact on speculative real estate markets.

Finally, demographic developments should also be taken into account when analyzing this topic. This is because demographic trends in Germany, particularly in shrinking regions, have an impact on the real estate market. A smaller population can lead to lower demand and a possible drop in prices. It is important to note, however, that the existing literature only sparsely examines the relationship between interest rate risk and real estate. A comprehensive outlook on this issue requires a careful analysis of current market trends, economic indicators, and policy decisions that go beyond the previous literature and this paper. Once an appropriate analysis is available, a more qualified statement can be made about how much interest rate risk actually affects real estate pricing.

Literature

[1] ALESSANDRI, P. and M. DREHMANN (2010) An economic capital model integrating credit and interest rate risk in the banking book. Journal of Banking & Finance. Vol. 34, No. 4, pp. 730–742.

[2] ANGBAZO, L. (1997) Commercial bank net interest margins, default risk, interest-rate risk, and off-balance sheet banking. Journal of Banking & Finance. Vol. 21, No. 1, pp. 55–87.

[3] ARLIA, D., DOLLS, M., FUEST, C., GSTREIN, D., KROLAGE, C. and F. NEUMEIER (2022) Entwicklungen am Berliner Immobilienmarkt ein Jahr nach dem Mietendeckel. ifo Schnelldienst, ifo Institute - Leibniz Institute for Economic Research at the University of Munich, Munich, Germany. Vol. 75, No. 4, pp. 50–55.

[4] BRÄUNINGER, M. and A. H. OTT (2006) Die zukünftige Entwicklung auf den Wohnungsmärkten in Deutschland. Wirtschaftsdienst. Vol. 86, No. 8, pp. 532–537.

[5] BUDDE, R. and M. MICHELI (2013) Monitoring regionaler Immobilienpreise. RWI Konjunkturberichte, RWI - Leibniz Institute for Economic Research, Essen, Germany, ISSN 1861-6305, Rhenish-Westphalian Institute for Economic Research (RWI). Vol. 64, No. 4, pp. 31–47.

[6] BULL, G. (2020) Bewertung und Entwicklung der Immobilienpreise in Europa 1999 bis 2019. Furtwangen University, Furtwangen, Germany.

[7] BULWIENGESA AG (2022) bulwiengesa-Immobilienindex. Munich, Germany. [Access November 16, 2023].

[8] BUNDESINSTITUT FÜR BAU-, STADT- UND RAUMFORSCHUNG (2022) Baufertigstellungen und Bauüberhänge. Available at: www.bbsr.bund.de. [Access May 23, 2023].

[9] CHANEY, A. and M. HOESLI (2010) The interest rate sensitivity of real estate. Journal of Property Research. Vol. 27, No. 1, pp. 61–85.

[10] DAHL, J. and M. GORALCZYK (2017) Recent Supply and Demand Developments in the German Housing Market. European Economy - Economic Briefs. Vol. 25, Directorate General Economic and Financial Affairs (DG ECFIN), European Commission.

[11] DR. KLEIN PRIVATKUNDEN AG (2023) Zinschart Baufinanzierungszinsen: Aktuelle Zinsentwicklung im Vergleich. Available at: www.drklein.de. [Access May 23, 2023].

[12] ENGLISH, W. B. (2002) Interest rate risk and bank net interest margins. BIS Quarterly Review. pp. 67–82.

[13] ENGLISH, W. B., VAN DEN HEUVEL, S. J. and E. ZAKRAJSEK (2018) Interest rate risk and bank equity valuations. Journal of Monetary Economics. Vol. 98, pp. 80–97.

[14] ENTROP, O., MEMMEL, C., WILKENS, M. and A. ZEISLER (2008) Analyzing the Interest Rate Risk of Banks Using Time Series of Accounting-Based Data: Evidence from Germany. Bundesbank Series 2 Discussion Paper no. 2008,01.

[15] FABOZZI, F. J., SHILLER, R. J. and R. S. TUNARU (2009) Property Derivatives for Managing European Real-Estate Risk. European Financial Management. Vol. 16, No. 1, pp. 8–26.

[16] GISCHER, H. and M. WEIß (2007) Entwicklung der Immobilienpreise im Euroraum: Bestandsaufnahme und makroökonomische Konsequenzen. ifo Schnelldienst, ifo Institute for Economic Research at the University of Munich, Munich, Germany. Vol. 60, No. 19, pp. 27–42.

[17] HERTRICH, M. (2019) A Novel Housing Price Misalignment Indicator for Germany. German Economic Review. Vol. 20, No. 4.

[18] IMMOWELT GMBH (2023) Real estate price search tool, 2023. Available at: https://www.immowelt.de/immobilienpreise/deutschland/hauspreise. [Access November 16, 2023].

[19] JUST, T. and W. MAENNIG (2017) Understanding German Real Estate Markets. Springer International Publishing Switzerland. International Real Estate Business School (IRE|BS), University of Regensburg, Regensburg, Germany and University of Hamburg, Hamburg, Germany.

[20] KHOLODILIN, K., MICHELSEN, C. and D. ULBRICHT (2014) Stark steigende Immobilienpreise in Deutschland - aber keine gesamtwirtschaftlich riskante Spekulationsblase. DIW Wochenbericht, German Institute for Economic Research (DIW), Berlin, Germany. Vol. 47, pp. 1231–1240.

[21] MADURA, J. and E. R. ZARRUK (1995) Bank Exposure to Interest Rate Risk: A Global Perspective. Journal of Financial Research. Vol. 18, No. 1, p. 1–13.

[22] PIEPELOW, V. (1991) Zinsänderungsrisiko und Zinsterminkontrakte. University of Cologne, Cologne, Germany.

[23] SWEENEY, R. J. and A. D. WARGA (1986) The Pricing of Interest-Rate Risk: Evidence from the Stock Market. The Journal of FINANCE. Vol. 41, No. 2, pp. 393–410.

[24] VAN HEMERT, O. (2010) Household Interest Rate Risk Management. Real Estate Economics. Vol. 38, No. 3, pp. 467–505.

[25] VICKERY, J. (2008) How and why do small firms manage interest rate risk? Journal of Financial Economics. Vol. 87, No. 2, pp. 446–470.

[26] VOIGTLÄNDER, M. (2013) The stability of the German housing market. Journal of Housing and the Built Environment. Vol. 29, pp. 583–594.

[27] WESTERMEIER, C. and M. GRABKA (2017) Zunehmende Polarisierung der Immobilienpreise in Deutschland bis 2030. DIW Wochenbericht, German Institute for Economic Research (DIW), Berlin, Germany. Vol. 84, No. 23, pp. 451–459.

[28] WRIGHT, D. M. and J. V. HOUPT (1996) An Analysis of Commercial Bank Exposure to Interest Rate Risk. 82 Fed. Res. Bull. 115.

[29] ZABEL, I. (2002) Auswirkungen der demographischen Entwicklung auf den Immobilienmarkt: Unter besonderer Betrachtung der Vermarktbarkeit von Wohnimmobilien in schrumpfenden Räumen. Diplomica Publishing House, University of Dortmund, Dortmund, Germany.

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