Duration, Convexity and Refinancer Diversification: Credit Portfolio Management for Real Estate Professionals

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Real estate portfolios consisting of investment properties have high implicit interest rate risks. These risks are influenced by the financing strategy chosen and can be managed in a targeted manner. Duration and convexity management always starts at the portfolio level and takes into account different interest rate scenarios as well as the steepness of the yield curve. At the portfolio level, it also makes sense to diversify the refinancing partners appropriately, with a mix of refinancers.

Real estate as a financial instrument

The value of an investment property (regardless of whether residential, commercial, hospitality or special properties) is determined mathematically by the expected future cash flow of the rental income[1], a possible option value due to additional utilization (opportunities to increase net income through investments and/or increased utilization) and the discount rate. In practice, the discount rate - consisting of a base interest rate and a discount rate for the the risk premium - is of considerable importance.

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The positive development of real estate prices in Switzerland over the last 10 years has been largely driven by the falling risk-free interest rate.

Real estate is therefore dependent on the development of the interest rate market. In Switzerland, studies for commercial real estate assume an average interest rate sensitivity of approximately 13 - a change in the discount rate of 1% thus triggers a change in value of 13%.[2] Depending on the structure of the leases and the individual property, the expected duration may also be higher or lower.

As a rule of thumb, duration is highest in the residential segment, followed by the commercial segment. The sensitivity to

[1] Which in turn are influenced by supply and demand changes in supply and the resulting changes in enforceable prices for existing and new leases

[2] See Chaney, A. & Hoesli, M., "The Interest Rate of Real Estate", *Journal of Property Research 27,1*, 2010, S. 61-85

interest rate changes is lower in the hospitality and industrial segments, but other risks are more significant there.

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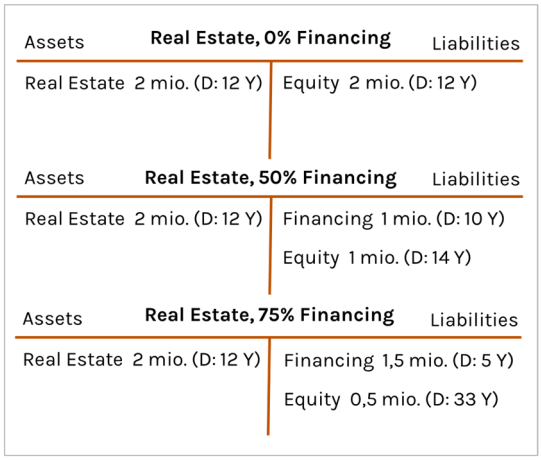
A property therefore has a similar modified duration to a Swiss federal bond of around 14 years. We assume that in the current interest rate and market environment, the duration is even higher, especially for residential properties.

Credits (mostly) lead to higher duration

In financial mathematical terms, a loan represents a short sale of a risk-free bond. Accordingly, the value of a fixed-rate mortgage also changes with the change in the market interest rate. For example, in the current low interest rate environment, the present value of a 10-year mortgage will lose nearly 10% of its value if the market interest rate increases by 1%, although of course the cash flow profile of the loan will not change.

At first glance, a mortgage thus reduces the interest rate risk of a property. However, the risk-bearing equity is also reduced - and the duration risk of the equity remains the only relevant parameter for the investor. See the calculation example below.

Figure 1: Equity duration risk



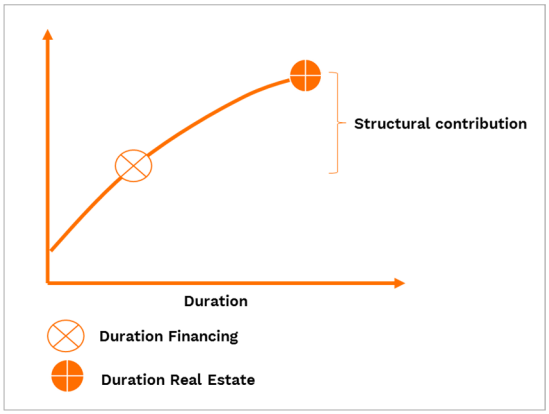
In practice, a combination of high loan-to-value ratios and short- or medium-duration financing leads to a very high duration of the equity capital; in practice, we observe durations of more than 30 in some cases. With such a positioning, the vulnerability to a rate rise is very high, but a falling interest rate level leads to enormous increases in value.

Steepness of yield curve

A high duration on equity represents a risk. The investor is compensated for this with interest savings due to the steepness of the yield curve. In practice, 10-year SWAP rates almost always exceed short-term rates (e.g. 3-month LIBOR/SARON). During the period January 1, 2010 - December 31, 2020, the median interest rate differential between the 10-year SWAP and 3-month LIBOR was 117 basis points.

In fact, a real estate investor - unless he uses very long-term mortgages – will benefit from this steepness, since the financing will always have a shorter duration than the investment.

Figure 2: Yield curve and structural contribution



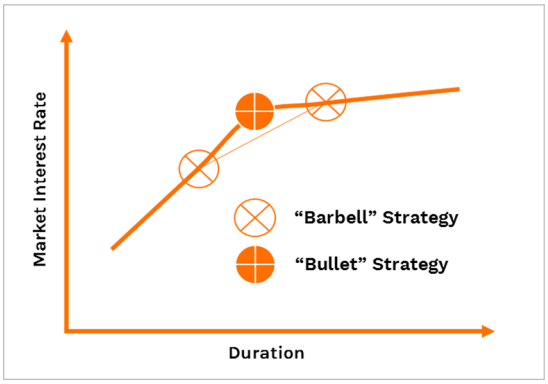
A real estate investor thus benefits - like a bank - from what is known as a structural contribution. When structuring the refinancing, this structural contribution can be optimized in a targeted manner - as a rule of thumb, the steeper the yield curve, the greater the opportunities to achieve a positive structural contribution.

Convexity of yield curve

Convexity measures the "curvature" of the yield curve. This curvature can also be used in refinancing, either by a so-called "bullet" strategy (e.g. a loan with a modified duration of 5) or a "barbell" strategy (as 50% each with durations 3 and 7). As a rule of thumb, a bullet strategy results in a higher interest charge, but a slightly more favourable performance for the borrower when interest rates change.

We generally advise against choosing financing with different durations per property (with the exception of mezzanine tranches, which are by definition short-term), as this reduces flexibility in renegotiations. For larger portfolios, however, a "barbell strategy" can be implemented by choosing different durations for different properties.

Figure 3: Different strategies



Default despite positive cash flow

For any asset partially financed with credit, the borrower must optimize 2 things: Cash flow and the loan-to-value ratio.

In the case of real estate, a positive cash flow on the construct means that the sustainable rental income exceeds the financing costs and the ongoing maintenance costs required. In practice, this cash flow can be calculated for years to come and is not critical in the case of high-quality real estate and long-term financing.

On the other hand, there is the risk of the loan-to-value ratio. In the event of a decline in the value of a property, e.g. due to a short-term rise in interest rates, there is a risk that the ratios between the loan and the value of the property defined in the financing are no longer given. Thus, lenders have the possibility to demand extraordinary amortizations even during the term of a fixed-rate mortgage under the loan agreements commonly used in Switzerland today. In principle, banks would also have to take into account that if market interest rates rise, the present value of the mortgage would also fall.

In any situation, a positive cash flow from rentals is positive for the earnings situation, but a default is still possible due to an unfavourable performance even with a positive cash flow for the near future.

Diversification of refinancers

The risk of obtaining no suitable follow-up financing in the event of a prolongation or extraordinary amortization represents the prolongation risk. Even though these cases have been rare in Switzerland over the past 20 years due to steadily rising real estate prices, experience, e.g. from the 2008/2009 financial market crisis in various European countries and the USA, shows that market conditions can change very quickly.

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«Diversification of refinancing partners reduces the prolongation risk in the portfolio»

A pure control of the duration and convexity of a portfolio in combination with a minimization of the paid risk premiums neglects the extension risk and the different and over time unstable risk preferences of the counterparties.

Historical experience in Switzerland and abroad shows that the behaviour of counterparties varies and that their risk preferences and -bearing capacity is not uniform. Likewise, providers differentiate more strongly between new and existing customers in crises than in upswing.

To manage this risk, it is therefore not only worthwhile to diversify refinancing partners, but also to pay particular attention to a mix of "partner types".

Figure 4: Cashflow Example

A mixture of major banks, regional banks, foreign banks, insurance companies and alternative financing partners (e.g. pension funds) is much more stable than, for example, a one-sided refinancing only via major banks. Moreover, it might be useful - especially if the portfolio is to be expanded - to cultivate targeted business relationships with providers of bridge loans and mezzanine financing.[3] This creates a corresponding track record.

Most important factors in the management of real estate refinancing

- Active management **Duration of equity**
- Active positioning on the yield curve, especially structural **contribution** and **convexity**
- Active **cash flow management** and **diversification of refinancing partners**

Portfolio view rather than single-object optimisation

Even some larger real estate investors still consider each property as an independent investment with its own refinancing. In case of a single development or promotional project or if a portfolio is to consist of a single property, this view is central.

With a portfolio consisting of numerous properties and thus financings, however, the design of the refinancing structure is relevant. The portfolio can be made more crisis-proof and/or higher-yielding through targeted control of duration and convexity and diversification of the refinancing partners.

Hyrock is an independent mortgage expert for sophisticated private and institutional clients in Switzerland, with offices in Zurich, Schindellegi and Geneva. In 2020, Hyrock realised a total of over CHF 850 million in financing solutions for its clients, with an average volume of CHF 7 million per transaction. Hyrock manages several large mortgage portfolios with an average portfolio volume of CHF 200 million. www.hyrock.ch

[3] See also: Bridge Loans – The Instrument of the Real Estate Professionals
https://www.hyrock.ch/media/bridge_loans_en.pdf