

Executive Summary

The real estate commitment of Switzerland does not only incorporate private owner-occupied space or income properties but also embraces indirect holdings through compulsory pension fund savings. Therefore, the whole population is directly or indirectly engaged in the market and the public wealth strongly depends on the real estate performance. The imminent risk of such a situation not only for retirement provision but also for the stability of the economy has been impressively demonstrated by the real estate crisis in the United States of America and is reflected across the vivid discussion about whether Swiss real estate market prices are beyond the correct valuation. Figuring out potential driving factors of the real estate performance is essential for clarifying whether market movements are fundamentally justified. For this reason, the goal of this master thesis is to improve the understanding of the price building mechanism of Swiss real estate investments.

To link this investigation to previous research activity and thus to identify the state of the art procedure in analyzing real estate markets, relevant literature is reviewed first. The focus lies on papers exploring the relationship between macroeconomic and / or country-specific financial factors and real estate returns. Moreover, it restricts to individual-country time series analyses during the last twenty years – in contrast to international comparisons across countries. Not considered are papers dealing with single real estate submarkets such as housing, office or industrial market. Pooling related factors explaining real estate returns, the assessment reveals that next to the stock market and to lagged return values especially inflation, interest rates, risk premiums and output variables are frequently selected for the models. The preferred estimation procedure is the Vector Autoregression methodology including the corresponding Impulse Response Functions. The technique allows for simultaneous demonstration of the effects of expected as well as unexpected changes in the lagged independent variables on today's real estate return. Since the study of Ewing / Payne 2005 is the most recent paper with a model composition involving the mentioned factor spectrum as well as the prevailing methodology, the article serves as reference for this master thesis.

The literature review also demonstrates that authors commonly refer to Real Estate Investment Trusts (REITs) as a proxy for real estate returns. However, Switzerland does not have a legislative framework for REITs. Rejection reasons are the coexistence of different tax authorities and laws, the fear of tax losses as a consequence of distribution effects and the equal tax treatment of similar assets. Thus, an alternative real estate time series has to be implemented. To determine an adequate replacement from a theoretical perspective, REITs are compared and contrasted with quoted real estate companies (in form of holding structure) and with real estate funds (for the legal entities according to the act on collective capital investments): The impossibility of redemption favors real estate companies as a substitute for REITs. In contrast, the existence of guidelines going along with a limitation of investment freedom supports the fund alternative. As far as tax considerations are concerned, the two investment vessels are comparable. The criterion income stream does not allow a clear

statement since it strongly depends on the profit allocation of the specific fund. In a similar way, the judgment of participation rights depends on the legal form of the fund. Thus, there is no clear favorite replacement for REITs identifiable from a theoretical perspective. Under practical aspects, however, data availability for Swiss real estate time series is limited. The DB Rüd Blass Swiss Real Estate Funds Index is the only suitable data set long enough and offering an adequate frequency for an empirical study. Hence, the task of this master thesis is to investigate the response of Swiss real estate funds to anticipated changes as well as to innovations in the factors inflation, monetary policy, default risk premium and economic output growth by applying a Vector Autoregression analysis. The factor inflation is represented by the Consumer Price Index (CPI) and the economic output growth is reproduced by the Gross Domestic Product (GDP). Referring to the Swiss National Bank, the three-month Swiss Francs London Interbank Offered Rate (LIBOR) serves as data proxy for the monetary policy. The default risk premium time series is calculated as the difference between corporate and government bond yields (based on Bernanke / Blinder 1992, Clinebell / Kahl / Stevens 1996 and Ewing / Payne 2005). Provided that returns consist of the risk free rate and the risk premium of the corresponding asset, what remains after differencing is the discrepancy in the risk premium between Swiss non-bank corporations of all rating categories and the Swiss confederation (referred to by the shortcut “default risk premium”).

The rationale behind involving the default risk premium as a variable influencing real estate returns takes place under the premise that it reflects investors’ expectations about the future economic condition: Assuming that a business downturn is followed by an increasing rate of corporate bankruptcy, investors anticipating less future economic activity adjust their investment pattern and the required risk premiums. In this respect, substitution away from relatively less attractive assets such as corporate bonds to real assets may occur. As a consequence, the requested default risk premiums of assets perceived riskier rise. On the other hand, the additional demand in real assets boosts prices of real estate investments and thus increases returns for previous owners. The hypothesis is therefore that an increasing risk premium as defined above leads to higher real estate returns after controlling for macroeconomic factors.

A Vector Autoregression model describes the evolution of the symmetrically treated variables over the sample period as a linear function of their history: There exists one equation for each variable regressing the current observation on its own lagged values as well as on the lagged values of all other variables. Thus, all variables in the system are treated endogenously and affect each other. It can be seen that after controlling for the remaining variables such as inflation, monetary policy and economic growth, the default risk premium of the previous period is the only state variable having a direct non-zero impact: An anticipated positive change in the default risk premium by one percentage point increases the real estate fund return in the following period by 2.3070 percentage points. The effect is statistically significant (at 10 percent level) and economically meaningful. In detail, if the difference in the risk premium between bonds of Swiss non-bank corporations of all rating categories and of the Swiss confederation increases by one percentage point, the real estate fund returns in the next period rise by more than two percentage points. It is fully consistent with the theory

as higher returns are required to compensate for higher risk. Moreover, the default risk premium affects every variable apart from inflation, implying the importance of the risk premium. Interestingly, the coefficient on the lagged default premium in the premium equation is positive which may suggest some persistence in the risk environment.

The Impulse Response Functions provide insight in how long and to what extent real estate fund returns respond to a positive one standard error shock in the state variables. The time path for inflation news shows that after an optimistic reaction in the first two quarters, real estate fund returns revert and fall even under the initial pre shock level. Neglecting the tiny activity up to the fifteenth year, the effect approaches zero in the fourth year following the shock. Contrary to the pattern of inflation, unexpected changes in the monetary policy cause a downturn of real estate fund returns during the first semester before they recover even past the initial level. Though, the mitigation of the shock impact takes much longer. Although it constantly returns to zero, total recovery to the initial level takes more than twenty years. The time path for an output growth shock reveals that the corresponding evolution of real estate fund returns is ambiguous. However, volatility diminishes over time and the shock impact is absorbed after five to six years. Disregarding the negligible impulse response from the sixth year on, innovations in the default risk premium affect the real estate fund returns positively throughout. Returns start leveling out right after the first quarter and converge to zero in the sixth year. The biggest impact range is generated by unexpected changes in inflation. Comparing the extreme response magnitudes (not the cumulative shock impact), inflation news have the most depressing effect on real estate fund returns whereas default risk premium innovations push them up the most. The highest fluctuation in real estate fund returns is caused by output growth shocks. Whereas it takes about four to six years for the system to recover from shocks in inflation, default risk premium and output growth, unexpected changes in the monetary policy persist for more than twenty years and thus may have a more permanent influence.

To conclude, the results of the Impulse Response Functions are congruent with the evidence from the parameter estimate significance. In this respect, the effect of expected changes and of unexpected news is comparable. The combined findings suggest that the fundamental macroeconomic factors inflation, monetary policy and output growth do not have a significant positive or negative influence. In contrast, the substitution among assets or the portfolio regrouping captured by the evolution of the default risk premium difference seems to be a driving factor. This process, however, is assumed to be induced by the individual investors' risk assessments and bases on anticipated future perspective. Arguing that real estate prices are inadequately valued in case price evolution cannot be explained by real interest in floor space approached by the fundamentals anymore, the insignificance of the involved macroeconomic variables implies that real estate fund prices are very sensitive to over and under reactions.

However, the findings restrict to the direct effects represented by the parameter estimates of the real estate fund equation because a reliable interpretation of the indirect impact relations through feedback cycles among all equations in the system is very difficult. Another aspect is that combining two time series in order to get a default premium data set long enough for an

empirical study might be crucial. In addition, the conclusion drawn from a Vector Autoregression analysis can be very sensitive to the data frequency and to the order of the model. For example, whereas the default risk premium is the only variable having a significant impact on real estate funds in the VAR(1) model, findings for the VAR(3) model are reversed in so far that all variables except the risk premium are significant. Hence, it would be interesting to check the findings in a continuing study by repeating the analysis with different compositions. Such an extension could also involve different time series methodologies as for instance a Vector Error Correction Model, other real estate portfolios and / or impact variables to further check the robustness of the findings and thus to increase their reliability.