Potential drivers of insurers' equity investments

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Abstract

As a consequence of the ongoing low-yield environment, insurers are changing their business models and looking for new investment opportunities to deliver the required return. This paper focuses on investments in equities and main drivers of their changes in insurers' portfolios. In this respect, an empirical analysis for a period before and after the Solvency II introduction using both panel and pool regression was conducted. The obtained results suggest that macroeconomic as well as company specific indicators could explain changes in shares of equities in insurers' portfolios.

1. Introduction

The ongoing challenging macroeconomic environment requires full attention by regulators and policy makers alike. Several trends in the investment portfolio of insurers could already be observed, such as a shift from fixed-income assets towards equities, loans and mortgages or other alternative investments (EIOPA 2017). In this context, it is important for supervisors to monitor this development and assess associated risks to be able to take appropriate measures timely if needed. For this reason, changes in insurers' investment portfolios need to be modelled to anticipate potential trends in investment behaviour. In this study, we focus on the equity portfolio as a potential investment alternative to fixed-income assets. Hence, this article aims to investigate the main drivers of changing shares of equity investments in insurers' portfolios.

Low yields are clearly one of the main drivers of equity investments. However, there might also be other macroeconomic factors with a potential to influence insurers' investment behaviour, such as inflation and economic growth. In addition, company level data reflecting on insurers' specificities and their financial positions could further help to explain different dynamics in equity investments. The article tries to identify those indicators that would help to explain different investment patterns. Although the structural break due to the Solvency II introduction in January 2016 poses significant obstacles for empirical analyses, the new risk-based regulatory framework allows for better data comparability going forward. With the increase in data granularity and public disclosures, it will also allow more in-depth research with a longer time series going forward.

The remainder of the article is organised as follows. The next section provides a short description of the relevant literature. Section 3 provides a description of the employed dataset with some descriptive statistics and research hypotheses. Section 4 focuses on the applied methodology. On this basis, section 5 presents the obtained empirical results. The last section concludes.

2. Related Studies

The literature related to the insurance sector and its impact on financial stability has started to emerge relatively recently. Although, the focus remains on banking related studies, there are several analyses connected to insurance investments. Moreover, institutional investors are becoming more important in global financial markets, with

[67] European Insurance and Occupational Pensions Authority (EIOPA).

their assets under management rapidly catching up with those of the banking system over time (BIS 2007).

Genc and Basar (2015) investigate the impact of the 2008 crisis on the total investment portfolio of the insurance sector by employing a dynamic panel for insurance companies located in 30 European countries. They found that several insurance specific variables as well as some macroeconomic variables, such as the gross domestic product (GDP), influence insurance portfolios. Yo (2014) studies the influence of the financial crisis on the investment strategy of European insurers and analyses the efficiency of investment activities of European insurers. She concludes that investment portfolios of insurance companies are capable of resisting crisis phenomena more efficiently than other financial institutions. The papers draws the conclusion that, taking into account recent developments, European insurers should focus on equity and investment risk management to find new investment possibilities. Similarly, Hauton, Birouk and Bouloux (2012) show changes in investment portfolios for French insurers observing a shift in investment flows towards the French general government and banking sector. In addition, they observe an increase in the proportion of short-term securities. This is in line with the trends revealed by EIOPA's Investment Behaviour survey conducted in 2017 for the European insurance market (EIOPA, 2017). Da Silva et al (2011) investigate potential determinants of equity investments by long-term institutional investors using evidence from Brazil. However, their conclusions state that liquidity, size, leverage and corporate governance do not explain the size of the equity stake held by insurance companies.

Other studies focus on developing theoretical frameworks at micro level that could help a better understanding of insurers' investment behaviour. In this respect, Elliott and Siu (2010) introduced a model to discuss an optimal investment problem of an insurance company using a game theory based approach. Their model assumes the insurance company invests its surplus in a bond and a stock index. Hong-Chih and Yung-Tsung (2010) investigate optimal asset allocation for a general portfolio of life insurance policies. Their research provides a solution to both single-period and multi-period asset allocation problems in respect to life insurance policies.

This study builds on the previous literature by focusing solely on share of equity investments in insurers' portfolios combining both macro and micro data. To our best knowledge, this is the first attempt to address this specific topic for the insurance sector.

3. Data, Stylized Facts and Hypotheses

In order to explore the key determinants of insurers' investments in equities, we employ two different data samples. The first dataset contains panel data of 40 large life and non-life insurers traded on stock exchange markets covering life and full line insurers from 16 European countries from 2006 to 2016 with an annual frequency. The companies in the sample hold assets of EUR 6.36 trillion in 2016, corresponding approximately to 80% of total investment assets held by European insurers. The second pooled data sample encompasses 1683 insurers from 30 countries in EU/EEA that reported Solvency II data at the end of 2016. With total investment assets summing up to EUR 6.97 trillion in Q4 2016, the investment split of assets has been obtained using the look-through approach[68] for the second dataset. The two employed datasets cover different times in terms of the European regulatory environment of the insurance sector. The panel dataset refers to Solvency I data that is publicly

[68] The look-through approach refers to a calculation method based on the extraction of each of the underlying assets of collective investment undertakings ("CIU") and other investments packaged as funds and places them in the main categories (government bonds, corporate bonds, equities, etc.).

available[69] (with only one year overlap for 2016, year of entry into force of Solvency II Delegated Act), while the pooled dataset refers strictly to Solvency II individual figures available to EIOPA. The information on macro and market variables was obtained from Eurostat, ECB and FESE.

Our research hypothesis is that the share of equity in insurers' investment portfolios is driven by macroeconomic indicators as well as company specific data based on financial statements. Hence, the share of equity to total investment assets is treated as the dependent variable. The following macroeconomic variables were considered as independent variables: gross domestic product (GDP), long term interest rates (Maastricht criterion), inflation, size of stock exchange market measured as market capitalization over GDP, and taxation on capital. In addition, we employ underwriting costs as a company specific factor in the first dataset. In the second dataset we use the same macroeconomic and market variables as above, but in addition we consider the SCR ratio as an additional company specific variable. The rationale of including the explanatory variables mentioned is discussed further in our analysis below.

The real gross domestic product growth (GDP) is a key indicator for measuring the economic activity. In general, many studies have suggested that there is a causal relationship between the insurance sector and the economic growth (e.g. Bianchi et al, 2011).

Interest rates are the most frequently debated macroeconomic factor influencing the insurance sector. The impact of the low yield environment on insurers' investment behaviour was recently investigated by EIOPA (see EIOPA Investment Behaviour Report, 2017). This analysis suggests that insurers have slightly decreased their share of government and corporate bonds in the portfolio while the share of listed and unlisted equity has increased indicating a potential search for yield. For the economy in general, the relation between the interest rates and equities market is mostly indirect and one would expect to move in opposite directions. Generally, one would presume that with lower interest rates, stock markets should benefit causing equity prices to move up. Further, low returns coming from the fixed income assets portfolios of insurers in a low yield environment might be an incentive for asset managers to slightly shift towards other asset types such as equities. All these factors suggest that interest rates could have an important impact on the proportion of insurers' portfolios allocated to equities. Typically, we would expect that the lower the interest rates, the higher the share of equities in insurers' investment assets.

Inflation can impact stock markets via influencing insurers' investments strategies and/or balance sheet valuations. For example, a rise in inflation might cause a drop in equity price of a company since it is computed as the risk-adjusted present value of the company's future cash flows. On the other hand, increased prices could also lead to higher profitability translated to higher future cash flows and therefore a higher present value. However, the overall impact is typically negative. In order to measure the impact of inflation on the defined dependent variable, we include inflation as either an additional explanatory variable or by employing real interest rates constructed via Fisher equation. Hence, both nominal and real interest rates were considered.

Additionally, we include as an explanatory variable the stock exchange market capitalization as a percentage of GDP corresponding to each country in the sample. The idea behind selecting this as an independent variable is the fact that even with a harmonised regulation like Solvency II throughout EEA member states, the share of

[69] Main source used for Solvency I data at company level was Bloomberg.

equity investments exhibits a high heterogeneity across countries.[70]The variable serves as a proxy for the size and development of the local equity markets. The latest available Solvency II data shows that many insurers with high exposures towards equities tend to invest in local stock markets. Of course, insurance companies can invest outside their home country but this is generally more complicated as factors like exchange rates, different tax and fiscal policies and political risks can increase the costs of investments as well as the occurrence of new risks.

Another potential driver that might influence the share of equities in the investment portfolio of insurers is the capital taxation level in each country. Taxes on capital reflect a variety of taxes paid both by enterprises and households that include, among many other categories, taxes on financial and capital transactions and taxes paid on income or profits of corporations and taxation of capital transfer.[71] An inappropriate level of taxation could potentially have a negative impact for an economy especially on integrated markets like the EU internal market. This could be explained by the fact that an excessive taxation might interfere with the price equilibrium, thus translating into a loss of economic efficiency. In addition, capital's mobility such as profits shifting and foreign investments can influence investment decisions as confirmed in some empirical studies (Desai at al, 2004). We employ taxation on capital as a percentage of GDP as an independent variable to explore differences among countries.[72]

For the company specific factors, many of the balance sheet items have not been available or not consistently reported throughout the selected time frame to be included in our panel dataset. Hence, our choice has been limited to very few variables. In addition, some of the potential independent variables such as gross written premiums (GWP), earnings per share, dividends per share, book value per share, assets over liabilities, operational expenses have been excluded due to their correlation with other variables mentioned above.

Underwriting costs is one of the company specific variables included in the panel dataset. For insurance companies, the underwriting costs are defined as the total expenses that are attributable to the production of net premiums written.[73] In other words, these are the costs an insurance company must pay to remain in operation. In addition, these expenses are deducted from the insurers' income when determining the net profit. Typically, large expenses imply lower profits which could potentially be translated to diminished investments. Hence, underwriting costs could have an impact on the share of equities in the portfolio and one would expect the two to move in opposite directions.

Business expenditure on Research & Development (R&D) supports the market's technological progress. Thus, it relates to a population's long-term productivity growth and of its companies' development. Furthermore, there are empirical studies (Oswald and Zarowin, 2008) that have concluded that capitalization is associated with greater stock price information (particularly about future earnings) which could make the

[70] Equity investments seem to be high in countries like IS, SE and DK (above 30% of the overall portfolio) and in some of the cases with high home biased behavior.

[71] Taxation trends in the European Union, 2017, https://ec.europa.eu/taxation_customs/business/economic-analysis-taxation/taxation-trends-eu-union_en

[72] The tax on capital gains would be more appropriate to explain insurance investments in equities. However, as those numbers were not available for all countries included in our samples, taxation on capital was used as a proxy.

[73] Definition according to Bloomberg; computed as *The sum of Underwriting & Policy Acquisition Cost (Non-Life) and Underwriting & Policy Acquisition Cost (Life).*

equity market more attractive for investors. Therefore, we investigate if insurers publicly traded in countries with tradition in investments in research and development are prone to invest more in stocks.

Insurance companies are required to hold eligible own funds at least to cover their Solvency Capital Requirement (SCR) according to the Solvency II regulation. The SCR ratio is defined as the ratio between eligible own funds and the SCR. Its calculation is directly linked to the asset-liabilities management of the insurance companies. As equities bear a higher risk charge than for instance bonds in the SCR calculation, it is important to see the connection between the share of equity investments in the portfolios and the SCR ratio among insurers. Hence, we investigate the hypothesis that insurers with high capital positions tend to invest more in equities than less capitalized insurers. The study employs the SCR ratio as an independent variable only in the pooled dataset as this information is not available for the panel dataset.

Market capitalization of a publicly traded insurer gives a useful picture of the value of the company's shares. In addition, it gives an indication of the size of the company (small-cap, mid-cap or large-cap) as well as the outside perception of the public opinion of the insurer's net worth. One would expect that typically a large-cap company has a well-diversified portfolio that can reduce risk and volatility and maximize investment returns. However, this indicator was further excluded due to high correlation with other variables above.

Last but not least, the stock market index performance is connected to the insurance balance sheets on the asset side through the equities investments. In a low yield environment with insurance companies potentially looking for new investment opportunities to deliver the required return, the high stock market performance could attract investments from insurers. This comes with the drawback of increased market risk and high index volatility, especially in times of financial turmoil. Additionally, a high market return has a positive impact on the market value of existing equity holdings in insurers' portfolios. Hence, we included a stock market index performance that captures the developments in a global market (MSCI World) as well as an index that captures the equity market performance in Europe (MSCI Europe) to capture the first mentioned transmission channel as well as to control for the impact on existing portfolios. We would expect a direct positive correlation between insurers' share of equities and the stock market index performance.

The table below provides the list of all variables and their transformations employed in our empirical analysis for both datasets/models.

Table T.1: Variables description and transformations

Type	Variable	Variable description	Source
Panel data, Pool data	Equity/TA	Share of equity as a percentage of total investment assets, annual data	Bloomberg, EIOPA QRT[74]
Panel data	Underwriting costs	Underwriting costs, annual data	Bloomberg
Panel data	Business expenditure on R&D	Business expenditure on R&D (BERD) by NACE Rev. 2 activity, annual data	Eurostat
Pool data	MK/GDP	Stock exchange market capitalisation as a percentage of GDP, annual data	ECB, FESE, Eurostat
Panel data, Pool data	GDP	Gross domestic product at market prices, chain linked volumes, percentage change on previous period.	Eurostat
Panel data, Pool data	Inflation	HICP - inflation rate – annual average rate of change	Eurostat
Panel data, Pooled data	Real/nominal interest rate	Annual interest rates - Maastricht criterion bond yields are long-term interest rates, used as a convergence criterion for the European Monetary Union. Real interest rates calculated using the Fischer equation employing inflation above.	Eurostat
Panel data, Pooled data	Taxation on capital/GDP	Taxation on capital as a percentage of GDP, annual data	Eurostat
Pooled data	SCR ratio	Solvency capital requirement coverage ratio, Q4 2016	EIOPA QRT
Panel data	MSCI(EUROPE)	MSCI Europe Index, annual data	Bloomberg
Panel data	MSCI(WORLD)	MSCI World Index, annual data	Bloomberg

4. Methodology

In this empirical study, we employ two methodological approaches for different datasets to investigate the relationship between changes in the shares of equities and potential drivers such as financial, market and macroeconomic factors. First, we use panel data techniques to explore and quantify the impact of the independent variables described in the previous section on the dependent variable during 2007-2016. Additionally, we examine the potential link utilizing pooled data techniques for the second dataset.

4.1. Panel data estimation

First, a panel regression with fixed effects for a cross-sectional dataset has been used to empirically investigate the relationship between the share of equity (as a percentage of total investment assets) and the financial indicators combined with macroeconomic and market factors. Considering the lack of data for insurance companies and a short time series, a panel data approach seems to be the optimal way to estimate and test the mentioned relationship. As an advantage, the panel data regression allows for differences across insurers and within them over time, while controlling for the effects of unobserved or missing variables. In our case, this allows us to capture the company-specific effects and the unobservable differences between

[74] Equities include both listed and non-listed equities. Unit-linked and index-linked data were excluded.

companies. Hence, we have chosen to estimate the first model using a fixed effect regression on a strongly balanced sample. Another motivation in selecting a static estimation is to exploit panel data to control for unobserved time-invariant heterogeneity in cross-sectional models.

First, we test the correlation between the different variables to avoid multicollinerality. The upside of a fixed effects regression is that it removes the time-invariant features of individual companies allowing for the assessment of the independent variables on the dependent variable. Moreover, when using the fixed effects regression, the assumption that time-invariant characteristics are unique to the individual and that the error term and the constant are not correlated with the other variables should be valid. If this is not the case, then another model has to be used (i.e. random effects model). This has been tested by the application of the Hausman test. Our test results show that the fixed effects model is appropriate for our panel data.

The next step in the analysis was to check if time fixed effects are needed when running a fixed effects model by using Wald tests of simple and composite linear hypotheses about the parameters of the fitted model. Applying the test (Prob>F= 0.0438), we accept the null hypothesis stating that the coefficients for all years are jointly equal to zero. Therefore, the results suggest that time fixed effects are needed in this case.

Testing for cross-sectional dependence and contemporaneous correlation was performed using Pasaran cross-sectional dependence which tests whether the residuals are correlated across companies in the sample. A drawback of the cross-sectional dependence is that it can lead to bias in tests results. The results (Prob = 0.3871) show that our sample has no cross sectional dependence.

4.2. Pooled data estimation

The second approach to explore the link between the share of equities and the financial and market factors and macroeconomic indicators was performed on a pooled dataset. The lack of time series for Solvency II data is the main reason in choosing a simple pooled linear regression model. We have decided to add this second dataset/estimation in the study in order to explore the robustness of the first estimation, but also to compare results between the two samples. In this case an Ordinary Least Square (OLS) regression was applied controlling for the fixed effects at the country level.

5. Empirical results

In the case of panel data estimation, the results suggest that the share of equity investments in insurers' portfolios is clearly linked to the macroeconomic environment. Real interest rates appear to have a high impact on the allocation of equities in the insurance companies' portfolios. This is correlated with the fact that especially life insurers are broadly exposed towards fixed income assets due to their asset-liabilities matching. In addition, the low yields translated into deteriorating returns, especially for insurers with guaranteed interest rate contracts, representing an incentive for assets managers to allocate more to equity investments in search of higher returns. The impact of interest rates on the share of equities in total assets is negative, i.e. the higher the interest rates, the lower are the equities investments. Furthermore, high underwriting costs may negatively affect equity investments while the market performance indices (Europe and world) have a positive impact on the share of equities. We employ two different specifications for the panel regression where the first uses the stock market performance index for Europe, while the second includes the global stock market performance index. Taxation of capital as a share of GDP and business expenditure on R&D in the countries where these insurers are publicly traded do not seem to influence their investments in shares. This could be

potentially explained by the fact that most of them are groups that run their business in many markets and have a well-diversified portfolio around many countries.

Table T.2: Results of panel regression on 40 life and composite insurers

VARIABLES	Model 1	Model 2
Underwriting costs	-0.0716*	-0.0716*
	(0.0391)	(0.0391)
MSCI (EUROPE)	11.75*	
	(6.789)	
MSCI (WORLD)		3.748*
		(2.166)
Tax on capital/GDP	-0.205	-0.205
	(0.494)	(0.494)
Business expenditure on R&D	0.0322	0.0322
	(0.0377)	(0.0377)
Real interest rate	-1.512**	-1.512**
	(0.718)	(0.718)
GDP growth	0.638*	0.638*
	(0.352)	(0.352)
Constant	0.611	0.353
	(0.482)	(0.599)
Observations	357	357
R-squared	0.237	0.237
Number of Companies	40	40

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

In the pool regression model, the results show that interest rates have a negative impact (but to a lesser extent than in the previous model) on the share of equity in insurers' portfolios.[75] In addition, taxation on capital as a percentage of GDP in each country negatively affects the share of equity. This could be explained by the fact that in this case solo undertakings are used rather than groups and the national market has a larger influence on these companies than on the groups. On the other hand, the higher the SCR ratios, the higher is the share of equities in total investment assets. In addition, the market capitalization of the stock exchange as a percentage of GDP of the insurer's home country is also a significant variable. This suggests that undertakings located in countries with a well-developed capital market are more prone to invest in equities.

Table T.3: Results of pool regression on 1683 solo insurers at end of 2016

VARIABLES	Model
SCR ratio	0.0223***
	(0.00457)
Nominal interest rate	-0.0662*
	(0.0394)
MK/GDP	0.0930***
	(0.0265)
Tax on capital/GDP	-2.907***
	(1.064)
Constant	0.296***
	(0.0573)
Observations	1,623
R-squared	0.153
Country FE	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

[75] Compared to the panel regression model, nominal interest rates were used for the pooled regression.

Conclusion

This study builds on the available literature by investigating key drivers of investments in equity by insurers combining both macro and micro data. To our best knowledge, this is the first attempt to address this specific topic for the insurance sector. We employed several macroeconomic as well as company specific variables to empirically test their potential impact on insurers' investment behaviours. First, panel regression models with fixed effects using an annual dataset of 40 large insurers traded on stock exchange markets covering life and full line insurers from 16 European countries from 2006 to 2016 were applied. This model refers to Solvency I data with only one-year overlap for 2016 when Solvency II was introduced. Second, in order to check the robustness of the obtained results, the simple pooled linear regression using EIOPA Solvency II data of 1683 solo insurers at the end of 2016 was used, allowing for including additional company specific indicators. Results for both models were consistent and confirmed our hypothesis that both macroeconomic and company specific variables can explain the different allocation of equities in insurers' investment portfolios. In particular, both models revealed a negative impact of interest rates on shares in equity investments. The first model further suggests a positive impact of real economic growth and stock exchange market performance, while the second model points out a positive impact of stock market development in the respective country and the negative impact of taxation on capital. Additionally, several company specific variables were tested. Based on the first model, underwriting costs could negatively affect insurers' investment allocation towards equities, while the second model suggests that well capitalised companies tend to invest more into equities.

Given the ongoing low yield environment and increased geopolitical risks, it is important for both regulators and policy makers to understand the potential factors that could affect the investment behaviour of insurers. Our study provides a first analysis of such drivers that could influence allocation of equities in insurers' investment portfolios. Going forward, a longer time series will allow for better modelling of insurers' investment behaviour that could help to avoid or mitigate potential market instabilities stemming from herd behaviour or an excessive risk accumulation.

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