

Box 5

Investment strategies of euro area insurers and pension funds: procyclical or countercyclical?

Traditionally, the investment behaviour of insurance corporations and pension funds (ICPFs) has been viewed as having a stabilising effect on financial markets in that they act countercyclically by buying assets, the prices of which fall. Since ICPFs aim to match their long-term liabilities with their long-term assets, they are natural long-term investors and, as such, they typically hold assets until maturity and are less sensitive to short-term price movements. However, recent studies challenge this view by providing empirical evidence of procyclical

investment behaviour, whereby ICPFs sell assets after a drop in price, especially in periods of severe market stress.⁶⁰

This box sheds new light on the discussion by arguing that it is the underlying driver of a price change (rather than just the direction) that matters. In particular, under a market-consistent regulatory regime, ICPF equity valuation can be expressed as the difference between the values of assets and liabilities, where liabilities are discounted only by a risk-free rate of return, while assets are discounted by the risk-free rate and risk premia.⁶¹ When (bond) prices fall due to an increasing risk-free rate, the values of both assets and liabilities decline. However, the decline would typically be larger on the liabilities side as many ICPFs, particularly life insurers and pension funds, tend to have negative duration gaps. As a result, a rise in the risk-free rate would typically imply an increase in the value of ICPF equity. Conversely, a rise in risk premia would lower the value of assets and thus represents a negative shock to ICPF equity valuation.

Through their different impacts on equity, changes in risk premia and the risk-free rate can also imply different ICPF investment behaviours in response to a price change. In the event of a negative shock to equity, an ICPF could preserve its financial position by raising capital, reducing liabilities or selling assets. However, raising fresh capital in the market could be particularly difficult and expensive, especially in periods of financial stress. Significantly reducing liabilities is usually not a viable option either in the short term because most ICPF liabilities are of a long duration and new policies represent only a small fraction of all outstanding liabilities. Therefore, an ICPF may rather act on its asset level. In particular, an ICPF may sell bonds when their prices are falling due to an increase in risk premia (procyclical behaviour) and buy bonds when their prices are falling owing to a rise in the risk-free rate (countercyclical behaviour).⁶²

This box tests empirically whether this is the case. Specifically, as a dependent variable, security-by-security ICPF holdings of government bonds in all 19 euro area countries from the ECB's Securities Holdings Statistics (SHS) are used. The sample spans from the first quarter of 2009 to the last quarter of 2016 and thus includes the euro area sovereign debt crisis. As a proxy for the risk-free rate, the risk-free interest rate term structures, published every month by the European Insurance and Occupational Pensions Authority (EIOPA), are used, since European insurers apply them to the calculation of their technical provisions, in accordance with Solvency II. After assigning to each bond in the sample the value of the risk-free yield curve corresponding to its maturity, the risk premia are computed by taking the difference between the bond's yield to maturity at time t and the risk-free rate with the same maturity at time t .

In line with the theoretical considerations, the empirical results suggest a negative and significant effect of risk premia on euro area ICPF holdings of government bonds and a positive and significant effect of the risk-free rate on those holdings (see Table A). In

⁶⁰ See, for example, Bijlsma, M. and Vermeulen, R., "Insurance companies' trading behaviour during the European sovereign debt crisis: flight home or flight to quality?", *Journal of Financial Stability*, Vol. 27, 2016, pp. 137-154, and the references therein.

⁶¹ This is a very simplified approach, which aims to capture only the basic mechanism of equity valuation under a market-consistent regulatory regime such as Solvency II, while this mechanism would not be applicable to non-risk-sensitive regulatory regimes. Moreover, the regulatory regimes in place are usually more complex. For instance, Solvency II includes volatility and matching adjustments that are not considered here.

⁶² ICPFs' investment behaviour is likely to be influenced by many other factors such as liability characteristics, regulation, accounting and general industry practices. See, for example, *Procyclicality and structural trends in investment allocation by insurance companies and pension funds*, Bank of England and Procyclicality Working Group, July 2014.

particular, when not distinguishing between the different drivers of an interest rate/price change, the estimates indicate a countercyclical behaviour, whereby ICPFs buy bonds, the yield to maturity of which rises, i.e. the price of which falls (column 1). However, when risk premia are separated from the risk-free rate, their estimated coefficients are opposite and have the expected sign (column 2). Moreover, these estimates are robust to the inclusion of a number of control variables such as very granular cross-sectional fixed effects (column 3), time fixed effects (column 4), security-specific credit quality and residual maturity, fiscal fundamentals of the issuer country and volumes of recent Eurosystem purchases of government bonds under the public sector purchase programme (PSPP) (column 5). Moreover, the results also hold over shorter time spans, such as when excluding the data collected until the third quarter of 2013, which are subject to some quality limitations (column 6), or when using sub-samples such as that of insurance corporations only (column 7).⁶³ While a wide range of robustness checks further reinforce the presented results,⁶⁴ one drawback of the analysis is that it is based on a rather short time span. For instance, the results in columns 6 and 7 are based on a time period when both the risk-free rate and risk premia tended to decrease.

Table A

Estimated effects of the risk-free rate and risk premia on government bond holdings of euro area ICPFs

(Q1 2009 – Q4 2016)

Dependent variable	Log of holdings						
	Full					From Q4 2013 onwards	
Period							
Investor type	ICPF						Insurers
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Yield to maturity	0.0022***						
Risk premia		-0.011***	-0.013***	-0.011***	-0.013***	-0.018***	-0.014**
Risk-free rate		0.031***	0.030***	0.014***	0.025***	0.028***	0.018#
Security FE	Y	Y	N	N	N	N	N
Security-holder country FE	N	N	Y	Y	Y	Y	Y
Time FE	N	N	N	Y	Y	Y	Y
Observations	229,602	229,602	229,602	229,602	205,832	92,315	39,565
R-squared	0.947	0.947	0.960	0.960	0.964	0.968	0.953

Sources: ECB (SHS), Thomson Reuters Datastream, Bloomberg, OECD, EIOPA and ECB calculations.

Notes: The dependent variable is the log of the nominal amount of government bonds held by ICPFs in different euro area countries. All independent variables are lagged by one quarter to account for endogeneity (except for residual maturity). Columns 1 and 2 include the lagged value of the dependent variable and security-specific fixed effects (denoted as "Security FE"). In column 3, security-specific fixed effects are replaced by more granular fixed effects, at the security-holder country level (denoted as "Security-holder country FE"). In column 4, yearly fixed effects (denoted as "Time FE") are added. Columns 5 and 6 also include the following control variables: the log of VSTOXX (a proxy for market volatility); the log of residual maturity; a dummy, which equals one if the credit quality step of a security (defined in accordance with the Eurosystem credit assessment framework or ECAF) declines from one quarter to another (see Chart 13 in the Overview for more details on the credit quality steps used); the issuer country's debt-to-GDP ratio (as a proxy for fiscal fundamentals); and the log of the cumulative quarterly net purchases under the ECB's PSPP. ***, ** and # denote significance at the 1%, 5% and 15% significance levels, respectively (based on robust standard errors).

⁶³ To cover the period of severe market stress during the euro area sovereign debt crisis, the baseline regressions use the data from the Securities Holdings Experimental Statistics (SHES), which were collected on a voluntary and best-efforts basis and are thus subject to some limitations, in particular lower coverage of domestic holdings and the unavailability of the sector split between insurance corporations and pension funds in some countries.

⁶⁴ These include, inter alia, the use of alternative dependent variables (first difference in log holdings, a discrete buy-and-sell indicator), various proxies of the risk-free rate (OIS and German Bund yield curves) and a different type of asset (corporate bonds). The only exception found is the holdings of domestic government bonds, for which the coefficient of risk premia becomes insignificant. This exception is however not detected for domestic corporate bonds. Hence, it appears that ICPFs perceive domestic government bonds as "safe assets".

The estimated effects are not only statistically but also economically important. To illustrate this, Chart A describes three different macro-financial scenarios, while Chart B shows the size of the estimated effects. Using the baseline estimates in column 5, a rise in the risk-free rate by 100 basis points (bps) (Scenario 1), *ceteris paribus*, is estimated to increase euro area ICPF holdings by around 2.5% (i.e. by €48 billion). Such a scenario could, for instance, reflect a gradual rebound in long-term interest rates on the back of a broad-based economic recovery and a stable inflation outlook. On the other hand, an increase in risk premia by 100 basis points (Scenario 2), which could occur in the event of a repricing in global financial markets, is estimated to reduce ICPF holdings by around 1.3% (i.e. by €25 billion).⁶⁵ Moreover, if fiscal fundamentals and credit ratings were to deteriorate and, consequently, risk premia were to climb on the back of concerns about public debt sustainability, the estimated bond sell-off would be much larger (around €139 billion). The significance of the last scenario highlights the importance of close monitoring of ICPF exposures to credit risk.

Chart A

Macro-financial scenarios: description

Scenario	Description
Scenario 1: Increase in the risk-free rate	Parallel shift by 100 bps of the EIOPA risk-free interest rate term structure (reflecting e.g. a broad-based economic recovery and a stable inflation outlook); no change in risk premia
Scenario 2: Increase in risk premia	100 bp increase in the average risk premia of government bonds (reflecting e.g. a repricing in global financial markets); no change in the risk-free rate
Scenario 3: Public debt sustainability concerns	100 bp increase in the average risk premia; parallel shift by -20 bps of the EIOPA risk-free interest rate term structure; credit quality step decreases for half of the issuer countries; debt-to-GDP ratio of issuer countries increases by 5 percentage points on average

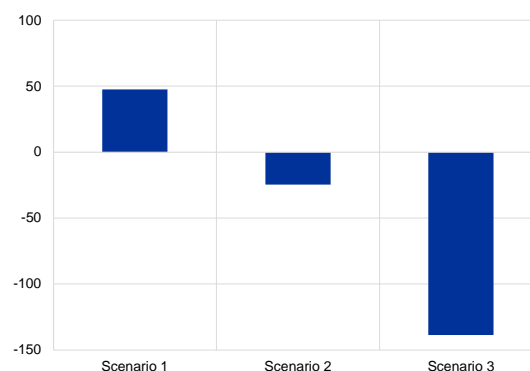
Source: ECB.

Note: For the definition of credit quality steps, see Chart 13 in the Overview.

Chart B

Macro-financial scenarios: estimated effects on sovereign holdings of euro area ICPFs

(Q1 2009 – Q4 2016, change in holdings in € billions)



Source: ECB calculations based on the empirical results in Table A.

This box contributes to the current policy discussion on macroprudential measures beyond banking by providing tentative evidence of procyclical ICPF investment behaviour.⁶⁶

These initial findings will eventually need to be validated over longer samples, in particular samples with a sufficient number of observations under the Solvency II regime, which entered into force only in 2016. The theoretical framework furthermore indicates that the macroprudential measures are especially relevant for ICPFs that operate under a market-consistent regulatory regime such as Solvency II. While Solvency II already includes measures of a macroprudential nature such as volatility and matching adjustments that were designed to mitigate the impact of widening credit spreads on insurers' balance sheets, their effectiveness under adverse market and economic shocks is yet to be tested in practice.

⁶⁵ All the results are interpreted *ceteris paribus*, i.e. considering that all other explanatory variables do not change. However, it is not realistic to assume that this would be the case in practice. For instance, risk premia and the risk-free rate often move at the same time.

⁶⁶ Further work is needed to understand the systemic implications of such behaviour, e.g. whether ICPF asset allocation strategies have a systemic impact on asset prices.