Momentum or Contrarian Investment Strategies: Evidence from Dutch institutional investors

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Abstract

This paper analyses investment strategies of three types of institutional investors – pension funds, life insurers and non-life insurers – over the period 1999-2005. We use balance sheet and cash flow data, including purchases and sales of equity, fixed income and real estate. We trace asset reallocations back to both active trading and revaluations and link investment decisions to firm-specific characteristics and macroeconomic variables. Overall, our results indicate that all three investor types tend to be contrarian traders, i.e. they buy past losers and sell past winners. Especially pension funds showed this behaviour in the most turbulent part of the sample – the crash of 2002 and early 2003 – implying that these institutions have a stabilising impact on financial markets when this is needed most. Life insurers tend to be contrarian traders when they have a high proportion of unit-linked policies, while non-life insurers are contrarian when they have a more risky business model.

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1. Introduction

As institutional investors manage a substantial part of global financial assets, their behaviour is likely to have a significant impact on financial market sentiment. This is particularly relevant in turbulent periods such as the collapse of the dotcom bubble in 2000-2003 and the credit crisis that started in 2007. In such circumstances, institutional investors may pursue contrarian investment strategies (selling past winners and buying past losers), which are likely to dampen excessive price movements. But they may also behave more like momentum traders (selling past losers and buying past winners) and exacerbate fluctuations in asset prices.[1]

Various papers have documented past-return based behaviour of investors. Grinblatt et al. (1995) find that mutual fund managers tend to pursue momentum investment strategies. Badrinath and Walhal (2002) report weaker evidence of this for several types of investment funds. Odean (1998) finds that the investors at a US brokerage house are reluctant to realize losses, and presents evidence that is consistent with contrarian investment strategies. Grinblatt and Keloharju (2000) is one of the few studies that address investment behaviour of many investor categories, including insurance companies. They conclude that foreign investors tend to be momentum investors, while domestic investors tend to be contrarians.

Most studies analyse firms' investments in individual stocks. We take a broader perspective, by considering past-return trading of the *entire* asset portfolio, i.e. changes in the composition of asset classes such as equity and bonds. Our research question is different from most other studies, namely: how do investors reallocate their portfolio in response to (excess) returns on these investment *categories*? Our data allow us to distinguish between four asset classes: equity, fixed income, real estate investments and liquid assets. The data do not contain information on individual items within these categories.

Apart from this new perspective on asset allocation, this paper presents three extensions to the existing empirical literature. First, we analyse investment strategies of *all* types of (Dutch) institutional investors, i.e. pension funds, life insurers and non-life insurers. Earlier asset allocation studies for the Netherlands have focused on pension funds (see e.g. Kakes, 2008;

[1] Contrarian trading and momentum trading are also known as negative and positive feedback strategies.

Bikker et al., 2009; Rubbaniy et al., 2010). To our knowledge, there are no similar studies on insurers. This is a serious omission as insurers comprise about one third of total institutional investments in the Netherlands.

Our second contribution is the use of flow data on active trading. Most asset allocation studies are based on balance sheet data, which do not reflect whether changes in the asset mix are driven by active trading or revaluations. We therefore combine balance sheet data with flow statistics which include total sales and purchases for each asset class as well revaluations, direct investment returns and other cash flows (premiums, payouts). This unique quality of our data enables us to distinguish between active investment policy and financial market conditions.[2]

Finally, we relate investment behaviour to macroeconomic developments and investor characteristics, such as firm size, solvency and profitability. This reveals which investor characteristics are important determinants of the type of investment behaviour pursued.

The three types of institutional investors we consider have common characteristics but also important differences. For instance, life insurers and pension funds have a relatively long investment horizon which makes it easier to absorb short-term fluctuations, while non-life insurers are likely to attach more importance to the liquidity of their assets. Life insurers are different in another respect: a significant part of their assets – almost one third – consists of unit-linked products, for which the investment risk is carried by the policy holders.[3] Non-life insurers and pension funds – which mostly offer defined benefit schemes in the Netherlands – are fully exposed to investment risk, so their behaviour is more likely to be driven by the characteristics of their liabilities.

We find that investors – especially insurers – are more contrarian when selling than buying, which suggests that investors are reluctant to realize losses, in line with evidence by Odean

[2] Using similar data for pension funds, Kakes (2008) finds that Dutch pension funds tend to buy (sell) equity and bonds when the prices of these assets are declining (rising), which points at contrarian trading. Bikker et al. (2009) find that Dutch pension funds partly rebalance their portfolios but also allow for some free floating. Rubbaniy et al. (2010) analyse monthly data on individual investment items and find both positive and negative feedback behaviour, depending on whether contemporaneous or lagged returns are considered.

[3] Many of these policies are related to mortgage and annuity products. In the Netherlands, households typically accumulate savings to repay their mortgage after 30 years to benefit optimally from tax deductibility of interest payments. In many cases unit-linked products follow a 'naive' strategy by purchasing fixed proportions of asset classes every month.

(1998) and Grinblatt and Keloharju (2001). Although all three investor categories tend to follow contrarian strategies, determinants that encourage such behaviour are different. For life insurers, contrarian behaviour is strongest for firms with a high proportion of unit-linked products, while for non-life insurers such behaviour is stimulated by risky business models. Pension funds play a particularly stabilising role when markets are most turbulent.

The remainder of this paper is organised as follows. Section 2 discusses the data and some stylised facts. Section 3 introduces our measure of momentum trading. Section 4 presents regresssions that relate investment strategy to economic developments and firm-specific characteristics and the economy. Section 5 presents two robustness checks, while Section 6 concludes.

2. Data and stylised facts

We use data from a quarterly survey (see Appendix 1 for details). Our dataset includes 93 insurers and 83 pension funds, representing more than 70 percent of the Dutch sectors' total assets. The data are available over the period 2002-2005, and a subset from 1999 onwards. This is a relatively short sample, but largely covers an interesting episode during which institutional investors had to deal with adverse financial market conditions after the collapse of the dotcom bubble. The Dutch insurance and pension industry is relatively large, especially because participation in a funded pension scheme is compulsory for most Dutch employees. On a global scale, the relative proportion of Dutch investors is of course limited, but insofar as their behaviour is representative for similar institutions worldwide our findings are also relevant for global asset markets.[4]

We carry out an analysis of investment behaviour and relate this to investor characteristics such as size, solvency and profitability. As indicated, the data allow us to distinguish broad asset classes but do not include information on individual investments. We also do not know investors' strategic portfolio weights and investment policies. So, although we cannot track portfolio management at a detailed level, we can observe to what extent insurers' overall asset allocation is consistent with contrarian or momentum trading.

[4] According to the 2009 *Global Pension Asset Study* by Watson Wyett, Dutch pension funds account for about 4 percent of pension assets worldwide.

Table 1 presents some stylised facts. Obviously, life insurers and pension funds have much larger balance sheets than non-life insurers, as they manage financial assets for their clients. By contrast, non-life insurers largely operate on a pay-as-you-go basis and use their invested assets as a short-term buffer. This also explains why non-life insurers hold more assets with a short-term maturity (i.e. less than 1 year). Looking at a broader measure of liquidity, all three sectors mainly invest in marketable assets. Presumably, life insurers and pension funds are more exposed to financial risk than non-life insurers. Their investments are much larger relative to premium income and benefit payments, while they also invest a larger proportion in equity and real estate. This difference in risk profile is also reflected by other proxies such as the standard deviation of the loss ratio (i.e. the ratio of losses incurred to premiums earned). Finally, pension funds invest more than insurers in foreign assets.

[insert Table 1 about here]

Both for equity and bonds, the volumes of gross purchases and sales are strongly correlated. Apparently, trades in both directions are clustered in particular quarters. This robust stylised fact is likely to reflect portfolio reallocations, both across and especially within the broad asset classes we consider here.[5] Graph 1 shows gross purchases of equity, bonds and real estate as a percentage of the total transaction volume (i.e. purchases plus sales). For life insurers' and pension funds' equity and bond investments, this percentage is more than 50 percent in nearly all quarters, implying that they are net buyers most of the time. For non-life insurers, the relative proportion of gross purchases fluctuates a lot, in line with their business: compared to the other investors, non-life insurers are likely to liquidate their investments more often to pay out insurance claims.

[insert Graph 1 about here]

[5] Typically, strategic portfolio reallocations take place annually while tactical adjustments are carried out more regularly. This includes important changes within broad asset classes. For instance, a firm may want to change the duration of its fixed-income portfolio or the composition over sectors and regions, which may require substantial purchases and sales.

3. Momentum trading measure

To investigate the relationship between portfolio adjustments and asset price development, we use the momentum trading measure developed by Grinblatt et al. (1995), which has been used by many other studies (e.g. Badrinath and Wahal, 2002; Curcuru et al., 2009). The intuition behind this indicator is straightforward: it relates net purchases to revaluations, which indicates to what extent investors tend to buy assets that have increased in value. We apply this approach to the relative weights of broad asset classes in firm-specific investment portfolios. Omitting a suffix for individual investors, the momentum measure is defined as:

$$M_t = \sum_{i=1}^{n} \left[\frac{a_{it} - \left[cf_t \cdot \frac{A_{it}}{\sum_{j=1}^{n} A_{jt}} \right]}{\sum_{j=1}^{n} A_{jt}} \cdot \left(r_{i,t-k} - r_{p.t-k} \right) \right] \qquad (1)$$

where n = number of asset classes, a_{it} = net purchase of asset class i in period t, A_{it} = total value of asset class i at the beginning of period t, cf_t is net cash inflow, r_{it} = the yield on asset class i (capital gains), and r_{pt} = the yield on the whole portfolio. The indicator assumes that investors act on the basis of excess returns, using the overall portfolio return of the particular investor as a benchmark.[6] The numerator in the first term reflects changes in the portfolio weight of asset class i due to active trading: net purchases a_{it} corrected for 'passive' trading assuming that cash inflows are invested according to the asset allocation at the beginning of the period. We distinguish three asset classes (n=3): equity, fixed-income and real estate.[7]

Active changes in portfolio weights for all three asset classes in period t are multiplied by the excess returns in period $t-k$. A negative value points at contrarian investment strategy in the sense that investors realise capital gains of asset classes that have outperformed the portfolio

[6] In Section 5, we will discuss the results of a robustness check using market returns instead of our firm-specific revaluation data.

[7] For these categories – which are the bulk of total investments – we have data on trading and revaluations. We could also include liquid assets as a fourth category, although we do not have flow data for these assets. However, a robustness check shows that this hardly affects M_t (see Section 5).

average. Positive values would imply the opposite strategy of momentum trading. The momentum measure is calculated for each observation in the sample.

Table 2 presents averages of M_t over the entire sample, both for 1-quarter and 2-quarter horizons and for current and lagged revenues ($k = 0$ and $k = 1$, respectively). As indicated, we do not know firms' investment strategies so presenting these specifications provides a sensitivity check of one important element: the investment horizon. Most figures imply contrarian investment behaviour. We also present separate momentum measures for buys and sells to check asymmetries. The evidence for contrarian behaviour is more pronounced for sells than for buys in most cases. Apparently, investors are more inclined to show contrarian behaviour following capital gains than losses. This asymmetry is in line with the findings of earlier studies. Grinblatt et al. (1995) even find momentum behaviour for buys versus contrarian behaviour for sells, while Badrinath and Wahal (2002) report a similar difference between entries into new stocks and exits. For US investors' foreign portfolios, Curcuru et al. (2009) find contrarian investment behaviour for sells and momentum behaviour for buys.

[insert Table 2 about here]

Graph 2 shows how the medians of the momentum measures have developed over time. In all cases, pension funds exhibited relatively strong contrarian trading in the early part of the sample (2002-early 2003). This makes sense, as stock prices declined sharply in this period so pension funds – which invest more in equity than insurers – needed to respond strongly. The M_t measure suggests that in the second half of 2003 their strategy temporarily changed to momentum trading, implying – as stock prices recovered – that many funds continued to buy.

[insert Graph 2 about here]

Life insurers also followed a contrarian investment strategy in early 2002 according to most measures. For the rest of the sample, M_t indicates that they did not exhibit a clear contrarian or momentum investment strategy on average. Finally, the momentum measures for non-life insurers show wide fluctuations that cannot easily be linked to developments in financial markets. Presumably, these are largely driven by short-term liquidity considerations related to their insurance business rather than developments in financial markets.

4. Investment strategy: explanatory factors

In this section, we present regressions that relate our momentum measure to possible explanatory factors. These are macroeconomic variables – like market sentiment or economic growth – but also firm-specific variables. Table 3 presents pooled regressions, relating M_t to the size of institutions (measured by their total assets), market volatility (VIX[8]), GDP growth, balance sheet liquidity, risk (standard deviation of the loss ratio), financial position (solvency ratio for insurers, funding ratio for pension funds), profitability (return on assets), the proportion of foreign assets and – only for life insurers – the proportion of unit-linked products.

One interesting issue to investigate is whether contrarian behaviour is different when markets are relatively volatile (indicated by a high VIX index). Insofar as momentum trading is inherently more risky, one may expect this behaviour for institutions that pursue a 'high risk-high return' strategy, which is likely to be captured by profitability and the standard deviation of the loss ratio. For balance sheet liquidity, exposure to foreign assets and unit-linked products we do not have strong a priori views about the impact. Unit-linked life insurance products are invested according to the policy holders' preferences. Often, these investments are purchased in fixed proportions, which introduces a 'naive' element that is difficult to relate to either momentum or contrarian behaviour.

Like in Table 2, we present regressions both for 1-quarter and 2-quarter horizons and for current and lagged revenues. To investigate possible asymmetries, we also present separate regressions for buys and sells.

[insert Table 3 about here]

For life insurers, most variables are insignificant in nearly all specifications, the main exception being the proportion of unit-linked activities which is significantly negative in most cases. Apparently, life insurers tend to follow more contrarian investment strategies if part of

[8] The VIX measures the implied volatility of S&P 500 index options and is often considered an indicator that reflects the market's expectation of global stock market volatility over the next month.

their investment risk is carried by their clients. Furthermore, this result is driven by sells, indicating that unit-linked products particularly enhance stabilising behaviour by realising capital gains. To the extent that unit-linked products can be related to household investment behaviour, this result is consistent with the finding of Grinblatt and Keloharju (2002) that households in Finland exhibit stronger contrarian behaviour than other investor types. Size, risk profile, return-on-assets and GDP growth have a significantly positive sign in some of the regressions – although they are insignificant in most cases – suggesting that these variables may discourage contrarian strategies.

Non-life insurers with a volatile loss ratio – reflecting a risky business model – tend to be more contrarian. Perhaps, these insurers follow a more stringent rebalancing strategy because they believe this reduces their overall risk profile. Like life insurers, return on assets and GDP growth stimulates momentum behaviour in some of the regressions. Finally, it is striking that the impact of the VIX index is asymmetric: for buys this variable is negative – consistent with life insurers – while for sells it is positive. Hence, in turbulent times non-life insurers are more willing to buy assets that have declined in value, while they are less willing to realise capital gains by selling assets. We do not have a clear explanation for this asymmetry; to some extent, it may reflect that financial positions are more resilient when stock markets are relatively stable, which creates more scope for insurers to raise their risk profile through a growing exposure to equity.

For pension funds, the negative impact of the VIX volatility variable suggests that contrarian trading is stronger during periods of market stress. This may be largely due to the early part of the sample, when stock prices collapsed and pension funds massively purchased stocks (see Graph 2). This implies that the pension sector's stabilising role is strongest when this is needed most.

It is interesting that some variables do not have any explanatory power in most regressions. This is particularly the case for the proportion of foreign investments and for investors' financial positions. Regarding foreign exposures, only two of the specifications for pension funds have a significant coefficient, indicating momentum behaviour for buys and contrarian behaviour for sells. For insurers, the finding that the financial position does not play a role may reflect that the solvency ratio as reported to the supervisor does not capture their own assessment of their financial position. De Haan and Kakes (2007) conclude that Dutch

insurers in general do not consider official solvency requirements a binding restriction, which is also illustrated by the fact that they typically hold two to three times the regulatory minimum (see Table 1). Pension funds are more likely to be guided by their funding ratio, but they also have more flexibility to deal with set-backs than insurers – e.g. by raising premiums or suspending indexation – which may enable them to pursue a rebalancing strategy that is unaffected by their financial position most of the time.

5. Robustness checks

We performed two robustness checks (not reported, but available from the authors). First, we repeated the analysis with a momentum measure based on four asset categories, adding liquid assets – deposits, short-term credit and cash – as a separate class. We do not have flow data for this category, but revaluations per quarter would probably be close to zero. For this reason, and because the relatively small proportion of these assets, the results indicate that the impact on M_t is modest and the regression results are virtually the same.

Second, we repeated the analysis using market data on revaluations instead of the firm-specific data from our dataset. For equity, fixed income and real estate we used, respectively, the global MSCI stock market index, a proxy for fluctuations in bond prices and the ROZ real estate index.[9] These proxies are inferior to the ones we used as they do not take into account differences across investors. For instance, the MSCI index gives a biased picture of equity performance for firms that invest in non-listed equity; our bond yield indicator does not take into account differences in duration and credit risk, and the ROZ indicator is only relevant for Dutch real estate. Nonetheless, it is useful to carry out this robustness check as we do not know how reliable the revaluation data are, while investors may also consider broader market indicators. Simple correlations show that the MSCI index is highly correlated (71%) with the median equity performance in our dataset, followed by the bond yield proxy (31%) while the ROZ is not significantly correlated (2%) with our data.

[9] The bond yield proxy is based on the assumption that a one percent increase (decrease) in long-term interest rates leads to a five percent decline (rise) in bond prices. The ROZ index is an overall index of Dutch real estate investments, published annually by the *Raad Onroerende Zaken*; we translated this into quarterly observations using a spline function.

The results are very similar to our initial findings for pension funds, but somewhat different for insurers. In contrast with our results in Table 2, the mean value of the momentum measure of both life and non-life insurers is not significantly different from zero for most specifications. However, these overall mean values mask the fact that the momentum measure fluctuate over time, similar to the pattern in Graph 2. In most regressions with explanatory factors, the VIX impact now has a significantly negative sign for life insurers and a positive sign for non-life insurers. This suggests contrarian behaviour by life insurers in turbulent times, in line with pension funds. Non-life insurers are more likely to show momentum behaviour in such periods, but because their total assets are modest compared to the other two categories (see Table 1), the overall conclusion remains that institutional investors have a stabilising impact in markets when this is needed most.

6. Conclusion

We analyse investment behaviour of three types of institutional investors – life insurers, non-life insurers and pension funds – using a quarterly dataset not only including balance sheet data but also flow data on active trading and cash flows. Overall, our results indicate that all three types of investors tend to be contrarian rather than momentum traders. Investors' behaviour is not constant over time, however, nor is it the same for all institutions within one sector. Contrarian investment responses are most pronounced when selling assets, i.e. following capital gains. Pension funds show the strongest contrarian behaviour in the most turbulent part of the sample, implying that these institutions have a stabilising impact when this is needed most. Life insurers tend to be more contrarian traders when they have a high proportion of unit-linked policies, while non-life insurers are more contrarian when they have a relatively risky business model. Non-life insurers show the least contrarian behaviour. In view of their relatively small size, however, the overall investment behaviour of Dutch institutional investors can be designated as being contrarian. Insofar as these outcomes are representative for the insurance and pension industry worldwide, this would imply that institutional investors are a stabilising factor in asset markets.

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Appendix 1 Survey data

We use data from a quarterly survey that was carried out by Statistics Netherlands and De Nederlandsche Bank, which consists of three types of data:

- *A detailed balance sheet of pension assets and liabilities*. Assets include listed and nonlisted shares, real estate, fixed income (bonds, loans) and deposits. These can be further split into subcategories: by counterparty (corporate sector, government, households) and domestic versus foreign investments. Our dataset does not include off-balance sheet exposures, such as derivatives.
- *Flow data of the main investment categories*. These are split into transactions and other changes (mainly changes in valuation).
- *Costs and benefits*, including contributions received and benefits paid (i.e. insurer claims, pension benefits). Pension contributions include both regular premiums and ad hoc contributions by the sponsor.

These data are available on a quarterly basis over the period 2002-2005, after which the set-up of the survey was changed. A subset is available from 1999 onwards. The survey does not cover all insurers and pension funds, although all the large institutions are included. In addition, insurers are part of the same financial group often report identical data, scaled by their total assets. In these cases, we only include the largest entity. Comparing the institutions we use in our calculations to the official aggregate figures for 2005Q4, life insurers, non-life insurers and pension funds account for, respectively, 73, 61 and 74 percent of total assets in their sectors.

Table 1 Stylised facts (1999-2005)

Variable	Life		Non-life		Pension funds	
	Mean	Median	Mean	Median	Mean	Median
Total assets (EUR mln)	9097	2482	636	265	4790	643
Asset mix (%)						
Equity	31.9	28.1	21.5	18.5	42.7	42.3
(of which listed)	(31.7)	(26.6)	(17.7)	(13.6)	(40.1)	(40.3)
Fixed-income	65.6	66.6	77.5	80.7	51.7	51.6
(of which bonds)	(37.1)	(33.0)	(49.7)	(52.5)	(42.9)	(44.2)
Real estate	2.4	0.2	1.0	0.0	5.6	1.4
Proportion foreign assets (%)	20.5	19.5	24.2	18.7	52.7	54.8
Liquidity (%)						
Proportion < 1 year maturity	6.4	2.3	16.3	7.8	3.3	2.1
Proportion marketable assets	81.1	81.6	84.6	91.0	86.5	90.8
Unit-linked investments (%)	29.9	22.4	..	..	..	..
Premiums (% assets)	3.7	2.8	18.7	14.4	1.0	0.7
Payments (% assets)	2.2	1.8	12.2	8.3	1.0	0.8
Return on assets	0.6	0.7	2.1	2.6	..	..
Solvency ratio[a]	285	246	327	278	130	127
Loss ratio (standard deviation)[b]	0.28	0.20	0.11	0.06	..	..
Loss reserves/incurred losses[c]	17.4	16.0	3.5	2.1	..	..
Aggregated assets (EUR bln, 2005Q4)	219.596		27.155		469.454	
Correlation purchases/sales[d]						
Equity	0.81***		0.61***		0.82***	
Bonds	0.90***		0.89***		0.95***	
Real estate	0.35***		0.02		0.36***	
Number of institutions						
Entire sample	37		56		83	
Maximum in single observation	24		41		80	

Averages and medians are calculated over all available observations in the sample.
[a] Insurers: actual solvency margin over required solvency margin. Pension funds: investments over liabilities (funding ratio).
[b] Standard deviation of the ratio of losses incurred to premiums earned, a proxy for risk.
[c] Proxy for the time lag between policy issuance and the payment of the benefits/claims, with higher ratios indicating longer tailed business.
[d] Correlation between the gross volumes of purchases and sales, all scaled by total assets. Significance levels of 1% are denoted by ***.

Table 2 Momentum measure: averages per investor category

		Life	Non-life	Pension funds
Horizon 1 qtr	Total	-0.0431	-0.1039*	-0.0266***
k=0	Buy	-0.0023	-0.0074	-0.0094*
	Sell	-0.0408*	-0.1114*	-0.0172***
Horizon 1 qtr	Total	-0.0290*	-0.0681	-0.0172**
k=1	Buy	-0.0023	0.0108*	-0.0058
	Sell	-0.0267**	-0.0789	-0.0114***
Horizon 2 qtr	Total	-0.1640**	-0.2736**	-0.0812***
k=0	Buy	-0.0183	-0.0077	-0.0350**
	Sell	-0.1487***	-0.2813**	-0.0465***
Horizon 2 qtr	Total	-0.1013*	-0.2098	-0.0861***
k=1	Buy	-0.0107	-0.0051	-0.0436**
	Sell	-0.0909*	-0.2149*	-0.0422***

Significance levels of 10%, 5% and 1% are denoted by *, ** and ***, respectively.

Table 3 Regression outcomes: dependent variable M_t

Total	Life insurers								Non-life insurers				Pension funds			
	H=1 k=0	H=1 k=1	H=2 k=0	H=2 k=1	H=1 k=0	H=1 k=1	H=2 k=0	H=2 k=1	H=1 k=0	H=1 k=1	H=2 k=0	H=2 k=1	H=1 k=0	H=1 k=1	H=2 k=0	H=2 k=1
Log(total assets)	0.0070	0.0141	0.0342	0.0297	0.0232	0.0258**	0.0604	0.0713	-0.0067	-0.0088	-0.0380	-0.0510	-0.0002	0.0034	-0.0005	0.0192
VIX index	-0.0024	0.0022	0.0135	0.0004	-0.0060	0.0008	0.0031	0.0012	-0.0066	0.0198**	0.0202	0.0681***	-0.0053***	-0.0040**	-0.0307***	-0.0361***
GDP growth	0.0067	0.0415*	0.1596	0.0623	0.0043	0.0334	0.1679	0.0815	0.0315	0.0634	0.2105*	0.2418**	-0.0129	0.0006	-0.1219***	-0.1497***
Liquidity (prop. < yr)	0.0952	-0.0270	0.3745	0.0394	0.1370	0.0919	0.4316	0.3382	-0.0883	-0.1005	-0.6207	-0.1461	-0.1381	0.0687	-0.2550	0.8913
Loss ratio (st. dev.)	0.1290	0.1297	0.3822	0.4109					-0.4142***	-0.3641**	-1.3510***	-1.2484***				
Solvency ratio	0.0001	0.0001	0.0003	0.0001					-0.0001	-0.0003*	-0.0006*	-0.0001				
Funding ratio													-0.0059	-0.0035	0.0468	-0.0016
Return on assets	0.9434	4.3391*	0.4782	14.1103					0.3526	1.3950***	2.1404*	0.9012				
Prop. foreign assets	0.0147	-0.1299	0.3873	0.1876					-0.0803	0.1327	-0.0497	0.2932	0.0143	-0.0004	0.0486	-0.0601
Prop. unit-linked					-0.1566	-0.1842**	-0.6773**	-0.7181**								
R^2	0.0090	0.0831	0.0543	0.0576	0.0152	0.0657	0.0610	0.0525	0.0582	0.0862	0.1190	0.1181	0.0116	0.0089	0.0451	0.0499
# observations	224	220	198	198	243	235	214	214	332	327	296	296	990	940	908	908

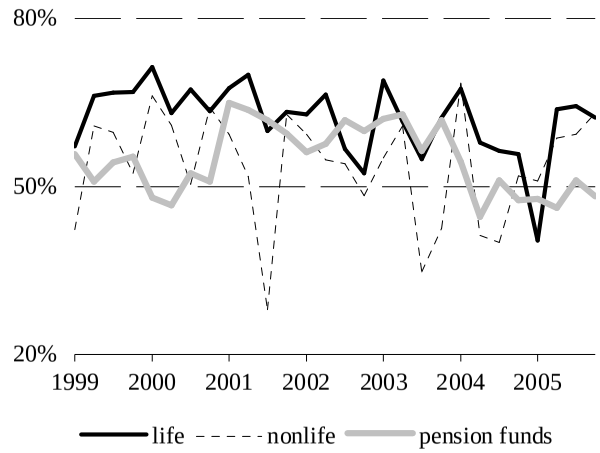
Buys	Life insurers								Non-life insurers				Pension funds			
	H=1 k=0	H=1 k=1	H=2 k=0	H=2 k=1	H=1 k=0	H=1 k=1	H=2 k=0	H=2 k=1	H=1 k=0	H=1 k=1	H=2 k=0	H=2 k=1	H=1 k=0	H=1 k=1	H=2 k=0	H=2 k=1
Log(total assets)	-0.0016	0.0025	-0.0046	-0.0016	0.0055	0.0033	0.0082	0.0030	-0.0003	-0.0052	0.0203	0.0001	-0.0053	0.0016	-0.0111	0.0821
VIX index	-0.0020	-0.0004	0.0113*	0.0007	-0.0053*	-0.0031*	0.0020	-0.0048	-0.0049**	-0.0050*	-0.0060	-0.0003	-0.0065***	-0.0068***	-0.0220***	-0.0289***
GDP growth	-0.0110	-0.0101	0.0757**	0.0036	-0.0183	0.0014	0.0443	-0.0133	-0.0013	0.0028	0.0021	0.0446	-0.0170**	-0.0059	-0.0629**	-0.1026***
Liquidity (prop. < yr)	0.0270	0.0291	0.1291	0.0856	-0.0066	0.0153	0.0680	0.0870	-0.0351	0.0270	0.0934	0.1125	-0.1568	0.0528	-0.8415	0.6853
Loss ratio (st. dev.)	-0.0095	0.0117	0.0338	0.1083					-0.0700	-0.0013**	-0.2440**	-0.8539				
Solvency ratio	-0.0000	0.0001	0.0001	0.0000					-0.0002	-0.0002***	-0.0001	0.0002				
Funding ratio													0.0190	0.0045	0.0636	0.0412
Return on assets	-0.0973	-0.5405	-0.1899	-0.1694					-0.0368	0.3477**	0.2640	0.1932				
Prop. foreign assets	0.0073	-0.0221	0.0104	0.0608					-0.0877*	-0.0082	-0.2831***	-0.0932	0.0214	0.0047	0.1291*	0.0598
Prop. unit-linked					0.0106	-0.0591	-0.0779	-0.1386								
R^2	0.0034	0.0172	0.0360	0.0155	0.0142	0.0366	0.0115	0.0173	0.0538	0.0492	0.0638	0.0838	0.0437	0.0339	0.0579	0.0650
# observations	224	221	213	213	243	238	228	228	332	329	318	318	990	949	937	937

Sells	Life insurers								Non-life insurers				Pension funds			
	H=1 *k*=0	*H*=1 *k*=1	*H*=2 *k*=0	*H*=2 *k*=1	*H*=1 *k*=0	*H*=1 *k*=1	*H*=2 *k*=0	*H*=2 *k*=1	*H*=1 *k*=0	*H*=1 *k*=1	*H*=2 *k*=0	*H*=2 *k*=1	*H*=1 *k*=0	*H*=1 *k*=1	*H*=2 *k*=0	*H*=2 *k*=1
Log(total assets)	0.0137	0.0116	0.0402	0.0371	0.0167	0.0207**	0.0495	0.0630*	-0.0038	-0.0075	-0.0652	-0.0039	0.0023	0.0045	0.0104	0.0102
VIX index	0.0020	0.0031	0.0152	0.0142	0.0009	0.0034	0.0123	0.0130	0.0017	0.0167***	0.0286**	0.0456***	0.0001	0.0018***	-0.0060**	-0.0053*
GDP growth	0.0311	0.0284	0.1577*	0.1214	0.0333	0.0269	0.1863**	0.1487	0.0225	0.0437*	0.1799**	0.1583*	0.0002	0.0050	-0.0550**	-0.0417*
Liquidity (prop. < yr)	-0.2403	-0.1016	-0.3628	-0.8002**	-0.1495	0.0222	-0.1410	-0.4292	0.0370	-0.0358	-0.3721	-0.1271	-0.0900	0.0409	0.0413	0.2070
Loss ratio (st. dev.)	0.2057	0.1223*	0.4871*	0.4954					-0.3856*	-0.2833***	-1.2250***	-0.0013***				
Solvency ratio	0.0000	0.0000	0.0001	0.0001					0.0001	-0.0001	-0.0004*	-0.0001				
Funding ratio													-0.0231	0.0005	-0.0108	-0.0195
Return on assets	-0.0039	4.0992**	-0.7840	9.36-3					0.2444	0.7905***	1.3839	0.4790				
Prop. foreign assets	-0.0380	-0.1069	0.0671	-0.0036					0.0178	0.1160	0.1972	0.3183	-0.0021	-0.0313	-0.0740	-0.1024**
Prop. unit-linked					-0.2275	-0.1297*	-0.6456**	-0.7067**								
R^2	0.0232	0.0920	0.0567	0.0681	0.0278	0.0448	0.0724	0.0811	0.0346	0.0763	0.0810	0.0851	0.0006	0.0063	0.0088	0.0090
# observations	250	246	223	223	272	264	242	242	421	418	383	383	1106	1057	1023	1023

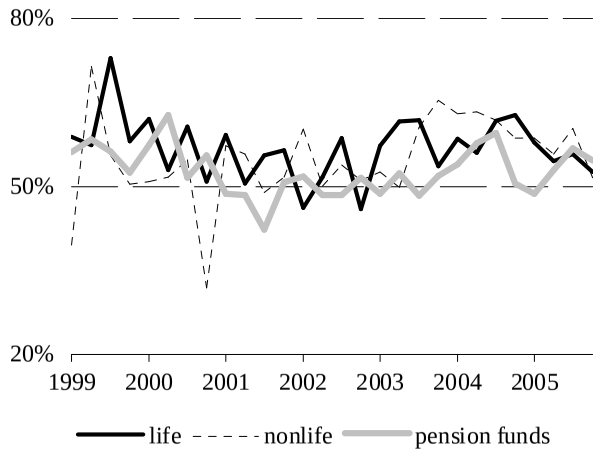
Explanation: Outcomes are multiplied by 100. *H* denotes the investment horizon: 1 or 2 quarters, meaning that the momentum measure is based on quarterly or semi-annual observations. The variable *k* denotes whether asset yields are included simultaneously or with a one-quarter lag. Significance levels of 10%, 5% and 1% are denoted by *, ** and ***, respectively.

Graph 1 Financial transactions: fluctuations in gross purchases

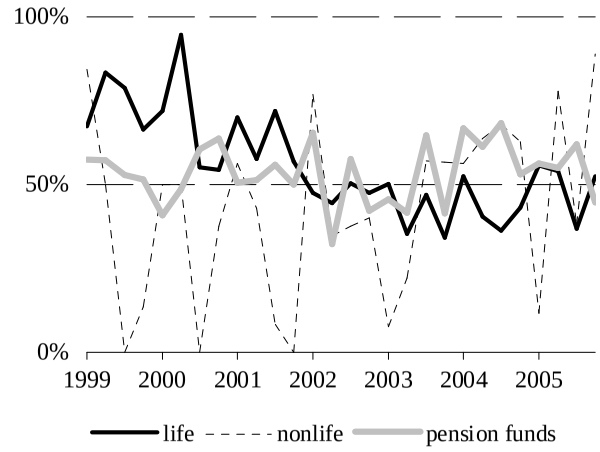
Shares
Gross purchases divided by total transaction volume



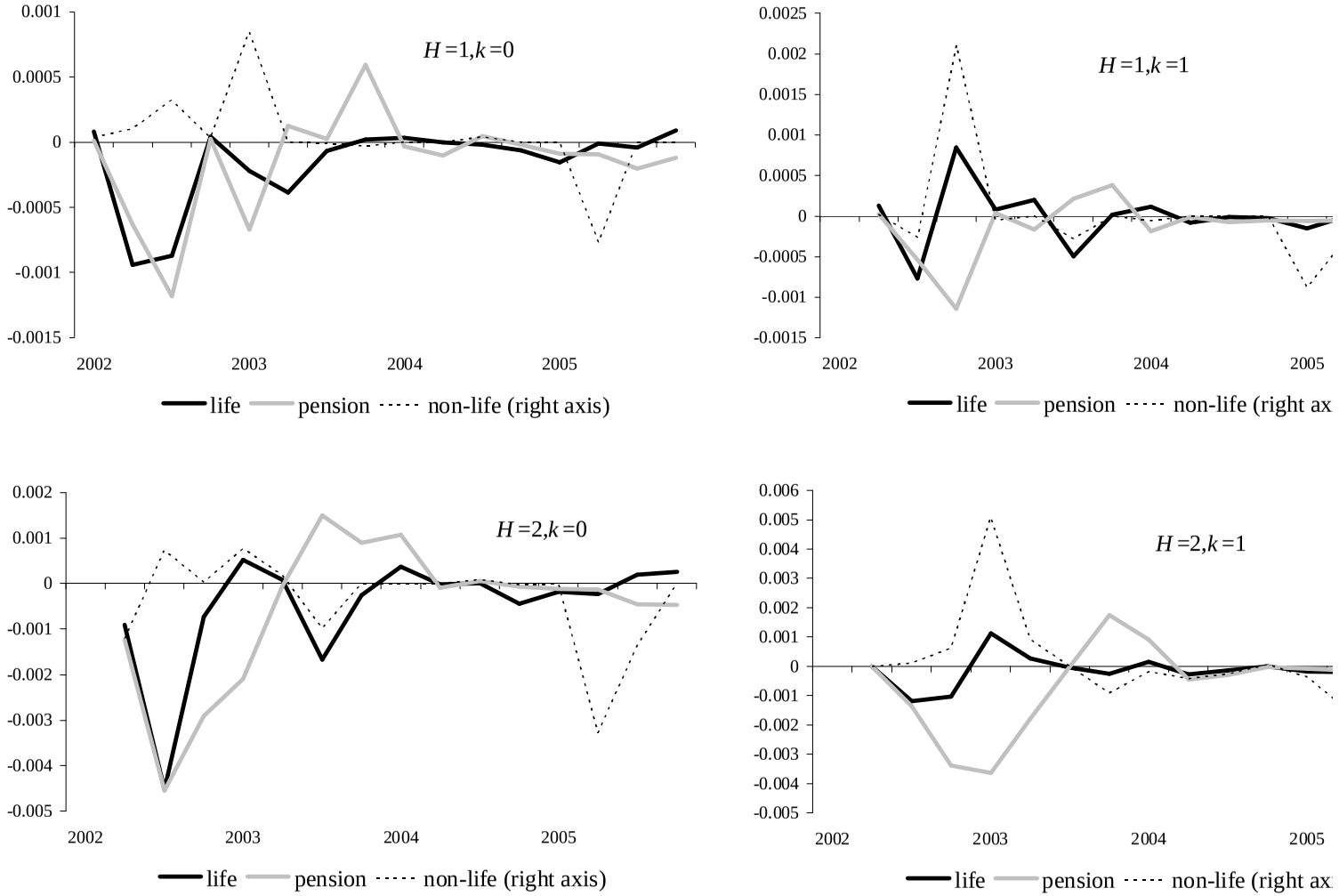
Bonds
Gross purchases divided by total transaction volume



Real estate
Gross purchases divided by total transaction volume



Graph 2 Development median momentum measure M_t



H is the rebalancing horizon (1 or 2 quarters); k indicates whether yields have been included as a simultaneous or lagged variable.