Evaluating the Financial Performance of Latvian and Estonian Second-Pillar Pension Funds

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Abstract

This study investigates whether Latvian and Estonian second-pillar pension fund managers can outperform European equity and fixed income market indexes on a consistent basis. The quarterly returns of 17 pension funds, for the time period from 2003 till 2009, have been studied. Findings confirm the conclusion of similar studies worldwide that it is very difficult to achieve outperformance. None of the pension funds investigated in this study managed to achieve a statistically significant positive Alpha using Jensen's model with both stock market and composite index benchmarks as independent variables. A modified Treynor-Mazuy model is used to separately evaluate the stock selection and market timing abilities of fund managers. The study helps to resolve a controversy about the market timing skills of second-pillar pension fund managers in Central and Eastern Europe, by confirming earlier US results that indicated a lack in this ability. Fund managers compensate for this deficiency by exhibiting positive, but not statistically significant, stock selection skills.

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1. Introduction

One of the biggest challenges that the economies of Central and Eastern Europe (CEE) face in the foreseeable future is the ageing of their population, which will strain their national budgets and existing pay-as-you-go pension systems. As a result, most of these countries have introduced multi-pillar pension systems; where, the traditional pay-as-you-go first pillar is supplemented by two pillars of funded pensions – mandatory second pillar and voluntary third pillar. Management of funds invested in the funded pension accounts is usually trusted to private investment management companies operating within a strict legal framework designed by national legislators to limit investment risk and the volatility of investment portfolios. Laws specify the maximum proportion of investment in equities and limit the choice of specific securities available for investing. These limitations make second-pillar pension funds different from private pension funds operating in the US, which generally specialise either in equity or fixed income securities and rarely operate as balanced funds containing both asset classes at the same time. As a result, financial researchers need to adjust their methods for performance evaluation of pension fund managers.

The aim of this paper is to study the performance of second-pillar pension fund managers in two CEE countries – Latvia and Estonia. The paper contributes to the existing literature in the following ways. First, it applies the Treynor-Mazuy model to pension fund data for Latvia and Estonia to evaluate stock selection and market timing skills. It partially resolves the controversy in previous findings about the market timing abilities of CEE country pension fund managers – and finds that in line with results for the US pension funds these managers underperform in terms of market timing. Second, it tests the viability of using another alternative for Jensen's one-factor regression model that includes a composite market return index with global, rather than country-specific, indexes as its components. Third, it evaluates the ability of second-pillar pension fund managers in Latvia and Estonia to outperform both stock market and composite equity and fixed income indexes on a statistically significant basis.

The quarterly returns of 17 pension funds are analysed for the time period from 2003 till 2009. Section 2 of the paper describes the regulatory framework in CEE for the second-pillar pension funds and provides an overview of current research on fund manager performance in CEE countries. Section 3 of the paper reviews various econometric models used to evaluate the performance of pension funds and proposes models for evaluating performance of Latvian and Estonian pension funds. Section 4 presents the results of the proposed models and Section 5 concludes this article.

2. Overview of the Regulatory Framework and Literature

At the beginning of this century, all three Baltic States introduced a three-pillar pension system with the traditional pay-as-you-go system as the first pillar, and funded mandatory and voluntary pension funds as the second and third pillars. Since 2002 the second-pillar pension funds in Latvia and Estonia are managed by private entities. An overview of the regulatory framework for the second-pillar pension funds in Latvia and Estonia is provided in the Appendix. Both countries place a similar 50% limit on equity investments, but the Latvian law is much more restrictive in terms of specific securities. More than 1 million or

72% of the working age Latvian population participate in one of the second-pillar pension funds. With such a wide investor base it is important to provide accurate information about pension fund performance so that people can make informed decisions about their choice of fund manager. The market is served only by actively managed funds with a weighted average total management fee of 1.66% in Latvia and 1.6% in Estonia. Therefore, if fund managers cannot earn superior returns in excess of a market index to justify their fees, a case could be made for the introduction of an index fund with a much lower management fee.

Bohl et al. (2008) provide an up-to-date overview of the second-pillar pension systems in Poland and Hungary; so, it is useful to compare the regulatory frameworks of these two CEE countries with the ones in place in Latvia and Estonia. Polish private pension funds started operating in June 1999. National legislation places the following limitations on them: no more than 40% can be invested in shares of domestic listed companies, and no more than 25% can be invested in other domestic mutual funds. The regulatory framework limits investments in foreign assets to 5% of fund portfolios, so that Polish pension funds must keep their money in Polish securities and bank deposits. An interesting regulatory feature present in Polish legislation is the legally required minimum rate of return to be achieved by pension funds. It is set at 50% of or 4% below the weighted average of the pension fund industry return for a rolling 36 month period. Hungarian second-pillar pension funds started their operations in the beginning of 1998. Hungarian pension fund legislation limits investments in domestic shares and mutual funds to 50% each; investment in foreign assets is limited to 30%. Pension funds are expected to achieve a minimum rate of return of 85% of the return on Hungarian long-term government bonds.

As we can see, the Estonian and Latvian legislators are much more liberal towards second-level pension funds by not setting a minimum required rate of return and not mandating domestic rather than international investment. The second difference can be explained by extremely small and illiquid domestic stock markets in Estonia and Latvia. A recent article (Mārtiņa, 2010) estimates capitalisation of the Latvian stock market to be 905 million EUR and that of the Estonian stock market – 1,550 million EUR. Besides, the free float (the value of listed shares other than those owned by strategic investors, which are unlikely to be traded actively) is estimated to be only 12% of the market capitalisation for Latvia and 41% for Estonia. Other legal features, like a maximum legally defined proportion of equity, are similar for the Baltic, Polish, and Hungarian pension funds.

Although the second-pillar funded pension funds play a central role in the capital markets of CEE countries, there is very little research studying the performance of the managers of these pension funds. To the author's best knowledge there are only two papers (besides the OECD study described later) investigating the performance of fund managers in Poland and Hungary – studies by Stanko (2003) and Bohl et al. (2008). Stanko (2003) studied monthly returns of 21 Polish pension funds for the time period from June 1999 to March 2003. Analysing both average regression alphas and regression alphas of individual pension funds and employing a variety of models, the author concluded that fund managers were able to outperform stock market indexes and possessed statistically significant market timing skills during the bear market which was present at that time in stock markets all around the world. Bohl et al. (2008) studied a longer time series, dating from June 1999 to August 2007, for 15 Polish pension funds and, from the first quarter of 1998 until the last quarter of 2004, for 18 Hungarian pension funds. Authors determined that, in line with Stanko, Polish pension funds, on average, outperformed the equity market index (WIG)

with a statistical significance when their performance was evaluated by using Jensen's Alpha model, with inconclusive results for the Treynor-Mazay model. However, results for Hungarian pension funds were completely different, with statistically significant negative alphas indicating underperformance under the Jensen's model and with statistically significant negative stock selection skills of Hungarian managers confirmed by the Treynor-Mazay model. Bohl et al. (2008) did not consider bond market index benchmarks, which in part invalidate their results – as the majority of the holdings of pension fund portfolios in both CEE countries were invested in fixed income securities and bank deposits. Results for individual pension funds were not published. We can conclude that the two studies for CEE second-pillar pension funds show contradictory results and further research is needed.

The topic of this paper is fund manager performance in the two Baltic States – Latvia and Estonia (Lithuania was excluded due to a lack of a public internet-based depository of pension fund reports and hence an inability by the author to construct a time series of pension fund returns). To the author's best knowledge, no English-language research is published to date about the performance of managers of individual pension funds in the Baltics. The only relevant English-language Latvian research article (Swinkels et al., 2005) did not address performance evaluation issues. Unlike Latvia, analysis of aggregate performance of the second-pillar pension fund managers in Estonia was done in a recent survey of pension fund performance by the World Bank and OECD. Antolin (2008) summarised results of this survey with more information available from a recent book (Hinz et al., 2010) published by the World Bank. The survey began at the end of 2006, with the Czech Republic, Estonia, Hungary, Kazakhstan, and Poland chosen to represent Central and Eastern Europe. Annual and monthly returns of pension funds were evaluated; in the case of Estonia returns from June 2002 until December 2005 were analysed. Estonian private pension funds achieved an annual real geometric mean return of 5.2%, with a standard deviation of 4.5%. Monthly return analysis of Conservative (containing no equity securities), Balanced (containing up to 25% equity securities), and Progressive (containing up to 50% equity securities) fund groups showed that Progressive funds achieved a statistically significant positive average Sharpe Ratio of 0.44 with *t*-statistics of 2.71 when the Estonian current account deposit rate is used as a benchmark of the risk-free rate. However, the Sharpe Ratio was only 0.064, and not statistically significant (*t*-statistics was 0.41), when the long-term Estonian bond yield was used as a risk-free benchmark. The study did not analyse the performance of individual Estonian pension funds. The study applied methodology developed by Sharpe (1992) to evaluate selection abilities of pension fund managers. In the reference period, returns of a pension fund were regressed against different market indexes representing the asset classes the pension funds were supposed to use for investing. This regression established attribution weights of each asset class in the pension fund portfolios. These weights were used to evaluate performance of pension funds in the next period and new weights were then calculated and the procedure repeated. The study established the following average attribution weights for the Estonian Progressive pension funds: 64% of Estonian current account deposit returns, 21% of world equity index returns, 10% of US bond returns, and 5% of Estonian stock market returns. Out-of-sample analyses were not done for Estonia due to the fact that only three years of monthly returns series were available. In-sample analysis, using average attribution weights, yielded statistically significant monthly excess returns of 0.56%, with *t*-statistics of 3.33175. However, the multivariate regression model achieved a relatively low regression R^2 of 0.45.

3. Measuring Pension Fund Performance

Current understanding of private pension fund performance measurement is related to the evaluation of mutual funds, because pension funds in countries like the US usually invest in only one asset class, such as equity or fixed income. As a result, equity mutual funds and equity pension funds are similar in their nature, if not in their legal setting. Jensen (1967) performed the most influential early study of equity mutual fund performance, establishing Jensen's Alpha as a standard measure of the ability of mutual fund managers to outperform the stock market index. Jensen tested the performance of 115 mutual funds and did not find any fund manager who had achieved statistically significant linear regression α and therefore outperformed the S&P 500 market index. The methodology of regression analysis was in line with the classical one-factor Capital Asset Pricing Model (CAPM) that derived a linear relationship between expected returns of any stock and returns of the market portfolio. It was replaced by a 3-factor model in the 1990's; as, Fama and French (1993) established book/market ratio and size (market capitalisation) as two other factors in CAPM besides market return. Two additional factors added later were stock price momentum (Jegadeesh and Titman, 1993) and liquidity (Pastor and Stambaugh, 2003). Carhart (1997) re-examined the performance evaluation issue with the 4-factor model, including three Fama-French factors and momentum as an additional factor. He examined the performance of 1,892 equity funds with the average management fee of 1.14% p.a. for the time period from 1962 to 1993, controlling for survivorship bias. The results proved that even the top-decile mutual funds do not significantly outperform the market, and their superior performance fades away a year after achieving it. Carhart also shows that the 4-factor model explains mutual fund returns better than the classical Jensen's one-factor model. A recent study by Kosowski et al. (2006) contradicts Carhart by claiming that the top mutual fund managers still achieve superior performance in the subsequent years. It employs the same 4-factor model, but applies a different method of statistically analysing its output.

Performance of equity pension funds in the US is a well-researched topic. Lakonishok et al. (1992) examined the quarterly performance of 769 defined benefit equity pension funds for the period 1983-1989. At that time around 80% of US pension funds were defined benefit, rather than defined contribution, funds. The S&P 500 was used as the benchmark index, and the average pension fund underperformed the index by 1.3% p.a. when annual returns were compared without any regression analysis. Coggin et al. (1993) tested the selection and market timing performance of pension fund managers using regression models developed by Treynor and Mazuy (1966) and Bhattacharya and Pfeiderer (1983). Monthly returns of 71 equity pension funds for the period 1983-1990 were examined using several equity market index benchmarks. On average managers achieved a positive, but not statistically significant stock selection ability against the S&P 500 market index, but exhibited a statistically significant negative market timing ability. Finally, Christopherson et al. (1998) used a conditional performance evaluation framework to evaluate monthly returns for 273 equity pension funds against a broad stock market index for 1979 – 1990 and determined that the average fund manager outperforms the index by 0.72% p.a.

Second-pillar pension funds in CEE countries differ from classic equity mutual and pension funds by having a substantial fixed income investment portion required by the law. Unlike equity fund performance, fixed income fund performance is a topic of very few studies. One such study by Blake et al. (1993) used Jensen's one factor model with a bond

market index to examine the performance of 41 bond mutual funds. They concluded that bond funds underperform passive fixed-income indexes by an amount roughly equal to management fees, and that there is no evidence that past performance can predict future performance. The stock selection and market timing ability of managers managing balanced mutual funds was evaluated in a working paper by Ke (2006). Ke evaluated 840 balanced mutual funds for 1976-2002 using six unconditional market timing model specifications and two conditional specifications. He concluded that an average manager of a balanced mutual fund possessed statistically significant positive market timing skills and negative stock selection skills.

In the following part of the paper a number of performance measurement regression models are reviewed. The classical specification of the mutual fund performance evaluation model by Jensen (1967) uses only one factor – market index return along with the risk-free rate in line with the classical one-factor CAPM:

$$R_{jt} - R_{ft} = \alpha_j + \beta_j (R_{mt} - R_{ft}) + u_{jt} \qquad t = 1, 2,\ldots, T \qquad (1)$$

where R_{jt} is the return on a portfolio j at a given time t, R_{ft} is the return on a risk-free proxy (a 1-year government bond), R_{mt} is the return on a market portfolio proxy, u_{jt} is an error term, and α_j, β_j are parameters to be estimated. A positive and statistically significant α_j means that the mutual fund is able to earn significant abnormal returns in excess of the market-required return for a fund of this given riskiness. This coefficient has become known as "Jensen's Alpha". In order to test a fund's ability to outperform a market benchmark, we test the null hypothesis: $H_0 : \alpha_j = 0$. Jensen uses the S&P 500 stock price index corrected for dividends as a market portfolio proxy. Using the excess return notation equation, (1) can be written as:

$$r_{jt} = \alpha_j + \beta_j r_{mt} + u_{jt} \qquad t = 1, 2,\ldots, T \qquad (2)$$

The OECD study (Hinz et al., 2010) uses two models to evaluate the performance of the pension funds. The first model adopts the Selection and Style approach of Sharpe (1992). The second model is a standard specification of the Sharpe Ratio (*SR*) in the following form using average excess portfolio returns divided by standard deviation (*SD*) of these returns:

$$SR = \frac{\overline{r_{jt}}}{SD\,(r_{jt})} \qquad (3)$$

As emphasised by Ke (2006), analysis of performance in the case of balanced funds must be performed with both equity and fixed income market benchmark indexes. Stanko (2003) highlights the two alternative approaches to adjust the basic Jensen's model (2) for the fixed income market component of a balanced fund. One approach is to replace r_{mt} with a composite index calculated as the weighted average of equity and fixed income market indexes. Another approach is to add the second fixed income market index as another independent variable in the regression equation (2).

In addition to determining managers' ability to outperform market indexes, we need a model to separately evaluate their stock selection ability of selecting the best stock and their market timing ability of shifting money between stock and bond markets, as well as a risk-free cash holdings. Two classical model specifications to test these abilities are models developed by Treynor and Mazuy (1966) and Bhattacharya and Pfeiderer (1983). We can

express Treynor-Mazuy model in the following form mentioned by Stanko (2003):

$$r_{jt} = \alpha_j + \beta_j r_{mt} + TM_j r_{mt}^2 + u_{jt} \qquad t = 1, 2,\ldots, T \qquad (4)$$

where positive alpha indicates positive stock selection ability and positive regression coefficient TM_j shows market timing ability of a fund manager. Ke (2006) proposes a modified specification of this model to include fixed income market index (BOND):

$$r_{jt} = \alpha_j + \gamma_j BOND + \beta_j r_{mt} + TM_j r_{mt}^2 + u_{jt} \qquad t = 1, 2,\ldots, T \qquad (5)$$

The previous examples show the methodology of designing performance evaluation models which are used to analyse stock selection ability of pension fund managers – evaluate a linear multivariate regression model by choosing market index returns of asset classes represented in pension funds as independent variables. Latvian and Estonian pension funds invest mainly in bank deposits, fixed income securities, and equity. Bank deposits and fixed income could be considered as one asset class; so our task is to choose benchmark indexes only for fixed income and equity. As both Latvian and Estonian currencies are pegged to the euro and Estonia plans to adopt the euro in 2011, the logical choice for investing pension fund assets is the universe of euro denominated securities, which eliminate currency exchange rate risk for pension fund portfolios. The most appropriate benchmark market index for euro denominated equity is the Dow Jones STOXX 50 value-weighted index, which includes large capitalisation stocks of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom. The key advantage for using this index was the availability of free time series for it from the European Central Bank. Usage of broader stock market indexes, like ones compiled by MSCI, was limited by the fact that free historical time series for this index was not available. In line with Carhart (1997), our model should also include additional Fama-French factors for euro zone countries, but they were omitted considering the extensive amount of time required to design appropriate factors with euro zone data[1]. So it was decided to use only one factor for the equity part of the final model.

The definitive study on factors explaining bond returns was done by Fama and French (1993). They used the following factors: *TERM* – the difference between monthly long-term government bond return and one-month Treasury bill rate measured at the end of the previous month; and *DEF* – the difference between the return on a market portfolio of long-term corporate bonds and the long-term government bond return. Both factors can be combined in a single excess return factor, as in Blake et al. (1993). After examining several alternatives, the Markit iBoxx EUR Benchmark Index for BBB corporate bonds representing the investment-grade fixed income market for the euro and euro zone bonds was chosen. The index is calculated and disseminated by Deutsche Börse. A viable alternative for this index might be a local Estonian or Latvian Treasury bond index to reflect the fact that a large portion of pension fund money is invested in local treasuries. However, such an index did not exist at the time of research.

[1] Datasets for individual countries like Germany, Italy, and the UK are available from the Kenneth French Web site http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/, but no combined dataset for the whole Europe or euro zone was available at the time of the research

Another question in specifying the model is a choice of weights for market indexes representing asset classes in the pension fund portfolios. Most studies on balanced mutual funds, including the OECD study (Hinz et al., 2010), employ dynamic weights derived from the actual fund performance data. For example, in (4) the weights are calculated in one time period and then used to evaluate pension fund performance in the next period. This approach allows getting a full picture of pension fund manager performance, but it does not yield a simple market index to be used by investors to evaluate pension funds. Hence it was decided to use fixed weights derived from the stated pension fund investing policies along the approach used by Stanko (2003). This approach is also justified by the fact that both in Latvia and Estonia there are strict legal limits for using equity instruments in the pension fund portfolios. The final model was specified with the following OLS regression equation in line with (2):

$$r_{jt} = \alpha_j + \beta_j \left(w_j r_{mt} + (1 - w_j)\, BOND_t \right) + u_{jt} \qquad t = 1, 2, \ldots, T \qquad (6)$$

where r_{mt} is the excess continuously compounded market return of DJ STOXX 50 index, w_j is the weight of equity asset class for pension fund j according to its policy, and $BOND_t$ is the excess continuously compounded market return of Markit iBoxx EUR corporate BBB rated bonds with a 7-10 year maturity. Parameters of the bond index were chosen to capture both default and maturity risk premiums. Local currency short-term bank deposit rates for Latvia and Estonia compiled by national banks were chosen as a proxy for the risk-free rate to reflect the fact that a large portion of pension fund money (close to one half in the Latvian case as explained in the next section) is invested in bank deposits. As one can see, the final model does not contain Latvian or Estonian stock market return index or bond market index. Although national banks compile information on Treasury security yields, bond market indexes accounting for both income and capital gains for on-the-run local Treasuries are not available. Latvian and Estonian pension funds invest a very small part of their equity-related investments in the local stock markets and focus mostly on foreign mutual funds; so, the European index for equity is more feasible. This assumption is also confirmed by the OECD study (Hinz et al., 2010), which estimated that 21% of returns of Estonian Progressive funds are related to the world equity market index, and only 5% of returns are related to the Estonian equity market index.

The robustness of the proposed model (6) can be checked by comparing its results to the standard one-factor Jensen model (2) used by Stanko (2003) and Bohl et al. (2008). Both models include all relevant information to evaluate pension fund performance, but they do not allow deconstructing this performance in terms of stock selection and market timing. As a result, both Stanko (2003) and Bohl et al. (2008) used the Treynor-Mazuy model, in addition to the classical Jensen's model, when evaluating managers' performance. However, both of them included only equity benchmarks in the model and did not adopt the bond market index adjustment proposed by Ke (2006).

4. The Data and Empirical Results

Quarterly Net Asset Values and holdings information of 8 Latvian and 9 Estonian "active" (containing an equity component) pension funds, operating since 2003, were obtained from

their quarterly reports published in the respective national pension portals[2] for analysis. Unfortunately the Estonian pension funds had different holdings reporting practices with most funds providing only a basic breakdown for equity holding percentage on a regular basis and occasionally adding further disclosures. For example, in the last report analysed from 2009, the LHV L fund, disclosed the percentage invested in equity, maturity breakdown for the fixed income investments, and the geographic breakdown for equity investments. For the same time period, Sampo Pension 50 fund reported the sector and geographic breakdown for the whole portfolio without disclosing the actual proportion of the portfolio invested in equity. Latvian funds performed much better with consistent disclosure of bank deposit and fixed income securities levels and occasional reporting of geographic information for their portfolios. Holdings information for Latvian pension funds is summarised in Table 1.

Table 1. Holdings Information of Latvian "Active" Pension Funds

Fund name	Cash and bank deposits, %		Fixed income, %		Equity, %		Percentage of total portfolio invested in:		
	Before 2008	2008-2009	Before 2008	2008-2009	Before 2008	2008-2009	Latvia	EU excl. Latvia	Outside EU
Hipo Fondi pensiju plāns "Safari"	57%	50%	33%	42%	10%	8%	n/d	n/d	n/d
Citadele (ex Parex) akt vais pensiju plāns	33%	43%	51%	49%	16%	8%	62%	30%	8%
SEB akt vais pensiju plāns	43%	51%	44%	34%	13%	15%	75%	19%	6%
SEB Eiropas pensiju plāns	42%	50%	46%	37%	12%	11%	79%	18%	3%
Norvik pensiju plāns "Gauja"	51%	75%	34%	23%	15%	2%	n/d	n/d	n/d
Finasta (ex Invalda) universālais pensiju plāns	34%	48%	48%	39%	18%	13%	n/d	n/d	n/d
Hipo Fondi pensiju plāns "Rivjera"	57%	43%	33%	48%	10%	9%	n/d	n/d	n/d
Swedbank pensiju plāns "Dinamika"	33%	33%	48%	25%	19%	42%	64%	20%	16%
Average	**44%**	**49%**	**42%**	**37%**	**14%**	**14%**	**70%**	**22%**	**8%**

Notes: The calculation of average geographic breakdown of fund portfolios was done for only 4 funds that provided consistent disclosure of the geographic location of their holdings for the years 2003 to 2009. The table provides separate average holdings calculation before and after the increase of the legal limit for investing in equity from 30% to 50% in 2008.

Sources: www.manapensija.lv, author's calculations.

As we can see, almost half of Latvian pension fund money was invested in Latvian bank deposits and a further 40% was invested in fixed income securities, mainly Latvian Treasuries. This home bias first described in Swinkels et al. (2005) was also evident in the percentage of money invested in Latvia – four pension funds providing this disclosure invested 70% domestically on average. Most funds, except the one managed by Swedbank, stayed well below the legal limit of equity investing, at an average 14% on money in shares and equity mutual funds, both before and after the limit was raised from 30% to 50%. Estonian pension fund holdings are presented next in Table 2.

Unlike Latvian funds, Estonian second-pillar pension funds generally attained the allowed maximum proportion of equity in their portfolios. Unfortunately they almost never reported the amount of money invested domestically, lumping Estonian investments together with other Baltic or CEE investments.

[2] Please refer to www.manapensija.lv and www.pensionikeskus.ee

Table 2. Holdings Information of Estonian "Active" Pension Funds

Fund name	Maximum stated proportion of equity, %	Actual average proportion of equity, %
LHV Pensionifond L	50%	41%
Kohustuslik Pensionifond Sampo Pension 50	50%	42%
LHV Pensionifond XL	50%	42%
Swedbank Pensionifond K3	50%	47%
SEB Progressiivne Pensionifond	50%	42%
Average	**50%**	**43%**
Kohustuslik Pensionifond Sampo Pension 25	25%	21%
Swedbank Pensionifond K2	25%	24%
LHV Pensionifond M	25%	21%
Average	**25%**	**22%**

Notes: ERGO Pensionifond 2P2 did not provide consistent disclosure of the actual percentage of equity in its portfolio and hence was not included in the table. The calculation of average holdings was done for years 2003 to 2009, except for the SEB Progressiivne Pensionifond, which stopped reporting holdings at the end of 2007, and both Sampo funds, which stopped reporting holdings in 2008.

Sources: www.pensionikeskus.ee , author's calculations.

Returns information for pension funds is analysed next. All returns are calculated net of all transaction costs and management fees. Table 3 provides descriptive statistics of the analysed funds for the time period from the second quarter of 2003 to the last quarter of 2009, sorted on Sharpe Ratios over the short-term local currency bank deposit rates calculated using equation (3).

Besides the Sharpe Ratios, the value in December 2009 of 1,000 EUR invested in each fund in January 2004 was also calculated. A benchmark 1,000 EUR investment at the local currency short-term bank deposit rate for the same time period yielded 1,386 EUR for Latvia and 1,278 EUR for Estonia. As we can see from Table 3, only one Latvian fund and 5 out of 9 Estonian funds managed to outperform the local currency deposit. Most Latvian pension fund managers invest in Latvian bank deposits and government securities, so the deposit rate is the best benchmark of their performance. As most Estonian pension funds invest a sizable part of money in equity (see Table 2), it makes sense to compare their monetary performance against a composite index containing both the local deposit rate and an equity market index (a bond index is not used, as the research later in this section shows that its introduction does not add value to regressions). As disclosure provided by the three LHV funds about the composition of their equity market holding reveals, Estonian funds invest in a diversified portfolio of a global nature. As a result, annual return statistics for the MSCI World equity market index were used instead of the DJ STOXX 50 index. The benchmark 1,000 EUR investments at the composite index of the investment at a local bank deposit rate and the chosen equity market index for the same time period as used earlier yielded 1,293 EUR for 50%/50% split between them and 1,286 EUR for 75%/25% split. 5 out of 9 Estonian funds outperformed this composite index for their target equity proportion; their results are marked in italics in Table 3.

Table 3. Descriptive Statistics of Latvian and Estonian "Active" Pension Funds

Fund name	Capitalisation, million EUR	Maximum stated proportion of equity, %	Value of 1,000 EUR, EUR	Management fee, %	Sharpe Ratio
Latvian pension funds					
Hipo Fondi pensiju plāns "Safari"	11.6	50% (30% until 2008)	**1,430**	1.63	0.07
Norvik pensiju plāns "Gauja"	13.0	50% (30% until 2008)	1,365	1.7	-0.03
Citadele (ex Parex) akt vais pensiju plāns	105.8	50% (30% until 2008)	1,340	1.5	-0.04
SEB akt vais pensiju plāns	136.2	50% (30% until 2008)	1,300	1.7	-0.12
Swedbank pensiju plāns "Dinamika"	308.5	50% (30% until 2008)	1,148	1.7	-0.153
Finasta (ex Invalda) universālais pensiju plāns	0.7	50% (30% until 2008)	1,239	1.71	-0.21
SEB Eiropas pensiju plāns	16.7	50% (30% until 2008)	1,260	1.7	-0.22
Hipo Fondi pensiju plāns "Rivjera"	3.7	50% (30% until 2008)	1,225	1.63	-0.31
Estonian pension funds					
LHV Pensionifond L	31.8	50%	***1,611***	2	**0.20**
LHV Pensionifond XL	6.5	50%	***1,510***	1.88	**0.14**
Kohustuslik Pensionifond Sampo Pension 50	113.7	50%	***1,396***	1.85	0.12
LHV Pensionifond M	3.3	25%	***1,417***	1.6	0.11
ERGO Pensionifond 2P2	23.2	50%	***1,454***	1.25	0.10
Swedbank Pensionifond K3	318.0	50%	1,203	1.59	0.03
SEB Progressiivne Pensionifond	219.0	50%	1,218	1.5	-0.01
Kohustuslik Pensionifond Sampo Pension 25	8.6	25%	1,259	1.75	-0.02
Swedbank Pensionifond K2	137.4	25%	1,110	1.49	-0.08

Notes: Capitalisation and management fee information provided as of December 2009. Value of 1,000 EUR investment in each fund invested in January of 2004 was calculated for December of 2009, results outperforming benchmark investment at a local short-term deposit rate are marked in bold, Estonian results outperforming a composite market index are marked in italics.

Sources: www.manapensija.lv, www.pensionikeskus.ee, author's calculations

A good benchmark for the Sharpe Ratio is calculated by Dimson et al. (2006) for worldwide investing in equity. Dimson calculates this benchmark ratio to be 0.25 p.a. or 0.125 quarterly. Only two Estonian funds and no Latvian fund managed to outperform this benchmark (their Sharpe Ratios are marked in bold in the Table 3). The average Sharpe Ratio for Estonian funds – 0.07 is in line with the one obtained by the OECD study (Hinz et al., 2010) using Estonian bond yields – 0.064. The poor results of Latvian pension funds might be explained by their overinvestment in bank deposits without seeking opportunities in the fixed income and equity markets. Estonian funds allocate a much bigger share of money for equity investing and are able to add value and justify their high management fees, which reach 2% p.a. in the case of the top performing LHV Pensionifond L.

Next we perform a regression analysis for the second-pillar pension funds using both Jensen's Alpha model (2) and the proposed composite index model (6). The information about short-term (up to 1 year) time deposit rates on national currencies were obtained from reports published by national banks at their Web sites. The time series for the DJ STOXX 50 index was downloaded from the European Central Bank Web site, and the Markit iBoxx EUR index was obtained from Indexo. In order to check the statistical significance of

intercepts and slope coefficients, while controlling for the small sample sizes of fund returns, residuals were re-sampled with 10,000 replications and bootstrapped *p*-values for each of $H_0: \alpha_j = 0$; $H_0: \beta_j = 0$ were calculated in line with methodology described in Chapter 4 of Davidson and MacKinnon (2009). The next table summarises the OLS regression results for both models along with their statistical significance in terms of bootstrapped *p*-values:

Table 4. Performance Statistics of Latvian and Estonian "Active" Pension Funds – Jensen's Alpha and Composite Index Models

Fund name	Number of observations	Jensen's Alpha model			Composite index model		
		α (*p*-value)	β (*p*-value)	R^2	α (*p*-value)	β (*p*-value)	R^2
Latvian pension funds							
Hipo Fondi pensiju plāns "Safari"	26	0.27 (0.58)	0.14** (0.014)	0.25	0.35 (0.49)	0.23** (0.027)	0.25
Norvik pensiju plāns "Gauja"	24	0.11 (0.78)	0.18*** (0.0006)	0.36	0.2 (0.57)	0.32*** (0)	0.45
Citadele (ex Parex) akt vais pensiju plāns	27	-0.1 (0.74)	0.15*** (0)	0.49	-0.02 (0.96)	0.25*** (0.0013)	0.46
SEB akt vais pensiju plāns	27	-0.23 (0.47)	0.13*** (0.0002)	0.5	-0.16 (0.67)	0.21*** (0.0014)	0.45
SEB Eiropas pensiju plāns	27	-0.35 (0.53)	0.09*** (0.0084)	0.34	-0.3 (0.63)	0.14** (0.027)	0.29
Finasta (ex Invalda) universālais pensiju plāns	27	-0.46 (0.48)	0.13*** (0.0004)	0.41	-0.38 (0.57)	0.25*** (0.0004)	0.49
Hipo Fondi pensiju plāns "Rivjera"	26	-0.49 (0.53)	0.08** (0.024)	0.33	-0.43 (0.51)	0.15** (0.017)	0.27
Swedbank pensiju plāns "Dinamika"	27	-0.71 (0.32)	0.36*** (0.0001)	0.66	-0.49 (0.56)	0.65*** (0)	0.74
Average		-0.24	0.16	0.42	-0.16	0.28	0.42
Estonian pension funds							
LHV Pensionifond L	26	1.22 (0.14)	0.45*** (0)	0.66	1.08 (0.2)	0.78*** (0)	0.75
LHV Pensionifond XL	27	0.63 (0.52)	0.43*** (0)	0.61	0.46 (0.68)	0.73*** (0)	0.69
ERGO Pensionifond 2P2	27	0.41 (0.63)	0.43*** (0.0001)	0.57	0.23 (0.82)	0.74*** (0)	0.68
Kohustuslik Pensionifond Sampo Pension 50	27	0.32 (0.58)	0.25*** (0)	0.54	0.32 (0.71)	0.41*** (0)	0.55
LHV Pensionifond M	27	0.3 (0.68)	0.27*** (0)	0.6	0.08 (0.92)	0.65*** (0)	0.76
Swedbank Pensionifond K3	27	-0.04 (0.94)	0.5*** (0)	0.68	-0.22 (0.74)	0.82*** (0.0001)	0.72
Kohustuslik Pensionifond Sampo Pension 25	27	-0.11 (0.76)	0.16*** (0)	0.48	-0.2 (0.54)	0.32*** (0.002)	0.44
SEB Progressiivne Pensionifond	27	-0.25 (0.7)	0.53*** (0)	0.65	-0.45 (0.56)	0.87*** (0.0001)	0.69
Swedbank Pensionifond K2	27	-0.47 (0.36)	0.32*** (0.0002)	0.6	-0.68 (0.36)	0.68*** (0.0021)	0.62
Average		0.22	0.37	0.6	0.06	0.67	0.65

Notes: Bootstrapped *p*-values with 10,000 replications are reported. A *p*-value below 0.01 indicates statistical significance at the 1 percent level and is marked with ***. ** indicates significance between 1 and 5 percent and * indicates significance between the 5 and 10 percent levels.
Source: Author's calculations

The weights for model equation (6) were chosen according to the stated target proportion of equity for each pension fund given in Table 3. Funds were sorted by regression alphas in Table 4. As we can see from Table 4, the composite index model did not add any value as

compared with Jensen's Alpha model for Latvian pension funds with an average regression R^2 essentially the same and the regression betas statistically significant for both models. The composite index model did marginally better in the Estonian case with a slight increase in the average R^2. Both models present regression alphas that are not statistically significant; so we can conclude that both Latvian and Estonian second-pillar pension fund managers do not possess statistically significant skills to outperform market benchmarks. The results obtained contradict the findings of Stanko (2003), who found that one half of the analysed funds (7 out of 14 survived funds with the longest set of observations, Table 8 in the referenced paper) achieved statistically significant regression alphas at the 5% significance level using Jensen's Alpha model with WIG, the Polish stock market index. One possible explanation for this would be the fact that, unlike the results presented here, Stanko did not calculate bootstrapped *p*-values, although a relatively small sample (46 observations) was used.

Table 5. Performance Statistics of Latvian and Estonian "Active" Pension Funds – Treynor-Mazuy Model

Fund Name	No of observations	α (*p*-value)	β (*p*-value)	*TM* (*p*-value)	R^2
Latvian pension funds					
Hipo Fondi pensiju plāns "Safari"	26	0.65 (0.32)	0.1* (0.085)	-0.0043 (0.32)	0.29
Norvik pensiju plāns "Gauja"	24	0.052 (0.93)	0.18** (0.013)	0.00074 (0.87)	0.37
Citadele (ex Parex) akt vais pensiju plāns	27	0.38 (0.33)	0.12*** (0.0005)	-0.0048* (0.052)	0.56
SEB akt vais pensiju plāns	27	0.28 (0.52)	0.1*** (0.0033)	-0.0051** (0.02)	0.58
SEB Eiropas pensiju plāns	27	0.057 (0.93)	0.07** (0.022)	-0.0041** (0.046)	0.44
Finasta (ex Invalda) universālais pensiju plāns	27	-0.14 (0.87)	0.11*** (0.0036)	-0.0033 (0.22)	0.44
Hipo Fondi pensiju plāns "Rivjera"	26	-0.69 (0.42)	0.1** (0.0155)	0.0024 (0.38)	0.26
Swedbank pensiju plāns "Dinamika"	27	0.27 (0.83)	0.3*** (0)	-0.0099** (0.016)	0.74
Average		0.11	0.14	-0.0035	0.46
Estonian pension funds					
LHV Pensionifond L	26	1.34 (0.45)	0.44*** (0)	-0.0013 (0.81)	0.66
LHV Pensionifond XL	27	0.93 (0.49)	0.42*** (0.0001)	-0.0031 (0.6)	0.61
ERGO Pensionifond 2P2	27	1.37 (0.22)	0.38*** (0.0001)	-0.0094 (0.12)	0.62
Kohustuslik Pensionifond Sampo Pension 50	27	0.73 (0.35)	0.23*** (0.0001)	-0.004 (0.3)	0.56
LHV Pensionifond M	27	0.23 (0.77)	0.28*** (0)	0.00064 (0.86)	0.6
Swedbank Pensionifond K3	27	1.63** (0.04)	0.43*** (0)	-0.016*** (0)	0.79
Kohustuslik Pensionifond Sampo Pension 25	27	0.16 (0.71)	0.14*** (0.0007)	-0.0026 (0.33)	0.5
SEB Progressiivne Pensionifond	27	1.55* (0.09)	0.45*** (0)	-0.018** (0.0026)	0.76
Swedbank Pensionifond K2	27	0.84 (0.2)	0.26*** (0)	-0.013*** (0.001)	0.75
Average		0.98	0.34	-0.0074	0.65

Notes: Bootstrapped *p*-values with 10,000 replications are reported. A *p*-value below 0.01 indicates statistical significance at the 1 percent level and is marked with ***. ** indicates significance between 1 and 5 percent and * indicates significance between the 5 and 10 percent levels.

Source: Author's calculations

Finally we use a model (4) to separately evaluate managers' stock selection and market timing skills (as the composite index model was shown to provide no superior results, the model (5) was not used). Results for this model are summarised in Table 5 using the notation, sorting of pension funds, and data applied in the previous calculation.

As we can see, results of the Treynor-Mazuy model show that a majority of Latvian and Estonian fund managers possess positive, but not statistically significant stock selection skills as evidenced by signs and the statistical significance of regression alphas, with only one Estonian fund achieving marginally significant regression alpha showing statistically significant securities selection skills which are cancelled out by statistically significant negative market timing skills for this particular fund. Most fund managers, both in Latvia and Estonia, possess negative market timing skills; as indicated by the sign of the TM coefficient in Table 5, but they are statistically significant only for a minority of managers. As mentioned above, research by Stanko (2003) and Bohl et al. (2008) about the market timing abilities of CEE country pension fund managers produced inconclusive results with positive statistically significant market timing skills for Polish funds as determined by Stanko, and statistically insignificant results for timing skills for Polish and Hungarian funds as determined by Bohl et al. (2008). The results obtained here in part help to resolve this controversy and bring results in line with the findings for US markets by Coggin et al. (1993) – Estonian and Latvian pension fund managers possess, positive, but not statistically significant stock selection abilities (as indicated by the sign of the alphas in Table 5), and somewhat negative market timing ability when the Treynor-Mazuy model is used to evaluate both of them.

5. Conclusions

Latvian and Estonian pension fund managers have adopted different approaches to managing their portfolios, although the legal frameworks are similar in both countries. Latvian managers are generally very risk averse and focus on local bank deposits and state Treasuries as their main investment vehicles, investing, on average, only 14% of their portfolios in equities. Estonian managers, on the other hand, fully exploit opportunities in equity markets and generally achieve the proportion of equity mandated in their fund prospectuses. Sharpe Ratio comparisons speak in favor of the Estonian approach – as shown in Table 3, Estonian fund ratios are, on average, higher. Besides, most of Latvian second-pillar pension fund managers have trouble outperforming a local currency short term bank deposit. Hence investors would be better off if they could go directly to banks and invest in deposits rather than paying management fees for managers to do the same for them. Estonian fund managers do invest in equities and as a result, half of them can beat both local currency deposit and a composite benchmark portfolio containing a broad stock market index. Neither Estonian nor Latvian fund managers achieved statistically significant performance against the European stock market and composite indexes. The proposed composite market index did not perform well in comparison to a standard stock market index and its adoption did not add value. In line with previous findings by Coggin et al. (1993) for US pension funds, pension fund managers in Latvia and Estonia suffer from negative market timing skills, which in some cases are statistically significant. Most of them are able to achieve positive stock selection skills, which are also not statistically significant. However, the significance of results is limited by a small number of observations (27) in the time series of

returns, so further research is warranted as time passes and more statistical information is accumulated about fund returns. Besides, in addition to unconditional beta models used in this study, further insights on fund performance might be obtained by using conditional beta regression models in line with Christopherson et al. (1998).

The main implications of this research are the following:

- In line with US pension funds, it appears that pension fund managers in CEE countries possess stock selection skills, but suffer from a lack of market timing skills that hampers their overall performance results. However, neither of these conclusions can be confirmed statistically.
- As only one Latvian pension fund seems to be able to outperform the local currency bank deposit returns, introduction of a balanced index fund might be appropriate to save on management fees (a bond fund managed by the Latvian State Treasury achieved a management fee of 0.75% – less than half of the present average). This could be done by lawmakers by mandating the creation of at least one index fund by each pension fund management company. Such index pension funds would serve as a low-cost alternative; as well as, a good benchmark to evaluate actively managed Latvian funds.
- Instead of presenting their relative performance within the peer group, pension funds performance should be evaluated against some market index in their reports. A good candidate for such a benchmark is the composite index consisting of bank deposits and a broad stock market index. In addition, pension fund Sharpe Ratios calculated with a meaningful risk-free rate could also be employed as benchmarks.

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Appendix. Regulatory Framework for Second-Pillar Pension Funds in Latvia and Estonia

In Latvia the legal framework for second-pillar pension funds has been established by the Funded Pensions Act (Republic of Latvia, 2009). It places strict limitations on the way pension fund managers make investments. Article 12 (1) specifies the following assets allowable as for pension fund investments:

- Government debt securities issued by EU member states or investment-grade OECD member states;
- Municipal bonds issued by EU or OECD member state investment-grade municipalities;
- Corporate bonds and shares listed in EU member state stock exchanges or OECD member state main lists of stock exchanges;
- EU member state bank deposits;
- EU member state registered mutual funds;
- Listed derivatives guaranteed by a EU member state bank;
- EU member state venture capital fund.

Article 12 (2) establishes the following asset class limits:

- Maximum 50% (30% until 2008) of total assets can be invested in shares or equity mutual funds;
- Derivatives can be used only for hedging;
- Maximum 5% of total assets can be invested in venture capital funds;
- Maximum 30% of assets can be denominated in currencies other than EUR or LVL.

In Estonia the second-pillar pension system is regulated by the Funded Pensions Act (Republic of Estonia, 2004a) and the Investment Funds Act (Republic of Estonia, 2004b). Article 269 of the Investment Funds Act specifies the following assets for pension fund investments:

- Shares of companies;
- Debt securities including convertible debt;
- Derivatives;
- Bank deposits;
- Real estate.

Articles 269-275 of the Investment Funds Act establish the following asset class limits:

- Maximum 50% of total assets can be invested in shares or equity mutual funds;
- Maximum 35% of total assets can be invested in bank deposits;
- Derivatives can be used only for hedging of foreign exchange risks;
- Maximum 10% of total assets can be invested in real estate;
- Maximum 35% of assets can be invested in money market securities.