A PROPOSAL OF SPECIALISED PORTFOLIO ALLOCATION MODELS AT THE VOLUNTARY PENSION FUNDS IN CROATIA

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ABSTRACT
Many of today's non-financial professionals search for liquidity, security and growth in personal wealth and investments. More than ever, it is important to divide competition and security when promoting optimal long-run net returns at an acceptable level of risk. The voluntary open-end pension funds in the Republic of Croatia, as one of the most suitable options, are necessary for a sustainable and balanced fiscal and monetary system that help individuals choose the frequency and the amount of payments for the personal account in funds to overcome the cost of inflation. From the authors' point of view, high capitalisation of personal accounts at the age of fifty-five plus should not be just a flexible upgrade towards the non-consumed retirement benefits. It should be respected and treated as a long-term investment with the annualised risk related to historical returns from the issued securities and assets on domestic and international markets. The securities and debentures' major distribution issue under the asset classes with a net worth of almost five billion HRK yield beneficiary effects primarily for Croatian government bondholders. While considering perception from the acts on voluntary pension funds data of the Croatian Financial Services Supervisory Agency, the authors propose alternative ratio analysis as scenario analysis for a different type of domestic and foreign managed assets. They point out the importance of proper interpretation of the Croatian government bonds relative to other asset classes. In the discussion part, the authors provide insight into the scenario model for separate capital gain tax as an option for capital market developments with beneficiary effects on blue chips in the funds' portfolio. In the final part of the paper, the authors will highlight the relevant quantitative and qualitative impact of data for voluntary pension funds in the Republic of Croatia.
Keywords: voluntary pension funds, ratio analysis, capital gain tax, securities

1. CHARACTERISTIC OF CROATIAN PENSION FUNDS SYSTEM
During the last two decades, the transition from introducing a three-pillar pension system (2002) set the foundations of today's pension finance framework on capital markets (Social & Network, n.d.). As a result, the Croatian systematic reform of pension insurance has been achieved through the objectives in the mixed public-private pension system with intergenerational solidarity (Nastale, n.d.). From the first pillar towards the third pillar, the insured person's contributions are collected to maintain social security and deploy well-functioning reciprocity and social justice (Social & Network, n.d.). More than ever before, from today's perspective, planning in terms of Croatian national budget execution contains pension payouts carried out through pension insurance companies regulated by the Act on Compulsory Pension Funds, Act on Voluntary Pension Funds, Act on Pension Insurance Companies and

other relevant legislation (Report et al., 2019). The reciprocity in the current pension system has several issues subject to the institutional framework of actuarial calculation appropriate for pension insurance companies and their fund members. While identifying agency problems and co-relationship within the scenario models and intra-industry trend analysis (Bezić et al., 2011), the authors are motivated to develop compensation measures. The authors have proven that using innovation in the distribution and technology channel as statistical tools or software can lurk similar results as best practices for public and private voluntary or specialised funds (Draženović et al., 2019). While moving forward, the authors' work proceeds as follows. The authors define the domestic retirement system's pros and cons along with the personal pension income model (PPIM) in section two. Section three provides a proposition for Smart PLS3® for a two-stage pension fund industry model. In section four, the authors suggest a variable in the Smart PLS3 model to directly contribute to knowledge and practice. Section five refers to the conclusion, while section six lists the relevant bibliography.

2. PERSONAL PENSION INCOME MODEL (PPIM)

Since 2017, the newly established Croatian National Reform Programme indicated market-oriented standards as platform rules to a penalised acceleration of early retirement (Vlada RH, 2017). The new reform's core idea was to optimise total control of the national pension costs while supporting proactive labour policies to create a more competitive labour market. To secure positive demographic changes as the pension system's initial sustainability, the contribution to pension funds deficit in the first pillar should be lower than EUR 2.2bn (Government, 2018). Moreover, the broad detected why support ratio decreased by 13.3% in 17 years (Social & Network, n.d.). As an effort to reduce the unhealthy ratio between the workforce and the pensioners, the modification of retirement pensions should address more cost-cutting. The authors have proven that positive effect on increasing the value in minimum insurance periods produces similar results as limiting pensions of privileged groups, which pensions are weakly associated with the contribution paid during the period of work. A similar conclusion was reached by specialised programmes that help workers find a job or part-time job beyond retirement age. This implies that raising the pension age to 67 years by 2038 is associated with diminishing incentives as penalties for early retirement as part of the maximum pension cap (Hess, n.d.). Assumptions based on these promising findings provide a good starting point for the development of low-cost transactional charges or fees (Roche, 2019). Future research could continue to explore agency problems, product imitation, information development, transmission, securitisation, and legislation as growing opportunities for fund management professionals, institutional investors, and wealthy individuals (Inderst, 2020). Since 2015 the voluntary pension funds have been showing a growing potential from membership acquisition for 38%, respectfully. The greatest deal of increase in membership refers to the greater public representation of monetary incentives in the maximum amount of HRK 750 for investment in a personal account in the voluntary pension fund. As previously reported in the paper, these measures motivate the investors to overcome domestic capital market risk while achieving the prescribed longer-term returns. For that purpose, the authors' personal pension income model (PPIM) describes the importance of planning in the short, middle and longer-term horizon (see *Table 2*). As a model, it maintains long-term stability from private investment through pension fund vehicles.

Table following on the next page

Table 1: Variables as inputs in personal pension income model (PPIM) for the Croatian employee

Current Age	30
Age of Retirement	65
Gross salary in HRK (monthly)	9.500,00
Expected average increase in salary	5,00%
Expected returns in the next three years (AR_{n+1})	3,25%
Personal contribution (yearly)	2,00%
Employer's maximal contribution (yearly)	2,00%

Source: data analysis in Excel made by the authors

The variables as inputs in the model are current age, planned age of retirement, current gross salary, the expected average increase in salary, expected returns in the next three years, personal contribution in percentages and employer's maximal contribution in percentages. According to the Croatian Pension Insurance Institute, by 2038, the average retirement will be at least 65 years for women and 67 years for men (*Croatia Country Fiche on Pension Projections*, 2018). The 9.5k HRK was taken as gross salary median value. In net terms, without any tax benefits on the salary, it is around HRK 6.5k. To obtain a more realistic picture of the model for the first five years of employment, the expected increase in salary represents the median increase in salaries by 5% for the three ongoing years. Moreover, the diminishing returns on domestic government bonds and the decreasing value of domestic stocks on capital markets defend the expected return value of 3.25% yearly. The authors have chosen for this model the same percentage factor for personal contribution and employer's maximal contribution to stay more realistic. Due to market and personal consumption uncertainties, it is hard to predict contribution factors relevant for the model's longer horizon. The starting point in the personal pension income model refers to the closing balance, where:

$$\sum_{i=1}^{n} PPIM(CB)_{n+1} = (OB_{n+1} + EYC_{n+1} + EYC_{\max(n)}) \times (1 + AR_{n+1})$$

(1)

The key contribution of this work is the solution that takes all independent variables as mentioned above into the closing balance calculation $PPIM(CB)_{n+1}$ at each year (1). N (n) stands for the successive year in the personal pension income model, while OB_{n+1} represents the opening balance at the beginning of each year. The total contribution explains the power of the employee's yearly contribution EYC_{n+1} and employers' maximal contribution $EYC_{\max(n)}$ for each year on the independent base. AR_{n+1} represents expected returns in the next three years in ceteris paribus state through the entire model (for all 35 years).

Table following on the next page

Table 2: Variables as inputs in personal pension income model (PPIM) for the Croatian employee's yearly contribution

Personal pension income model (PPIM)									
Age (Start)	Year	Opening Balance	Gross salary (monthly)	Employee Yearly Contribution	Employer's Yearly Contribution	Total Contribution	Annualized Expected Returns	Closing Balance	Closing Age
30	1	-	9.500	2.280	2.280	4.560	3,25%	4.708	31
31	2	4.708	9.975	2.394	2.394	4.788	3,25%	9.805	32
32	3	9.805	10.474	2.514	2.514	5.027	3,25%	15.314	33
33	4	15.314	10.997	2.639	2.639	5.279	3,25%	21.262	34
34	5	21.262	11.547	2.771	2.771	5.543	3,25%	27.676	35
35	6	27.676	12.125	2.910	2.910	5.820	3,25%	34.585	36
36	7	34.585	12.731	3.055	3.055	6.111	3,25%	42.018	37
37	8	42.018	13.367	3.208	3.208	6.416	3,25%	50.009	38
38	9	50.009	14.036	3.369	3.369	6.737	3,25%	58.590	39
39	10	58.590	14.738	3.537	3.537	7.074	3,25%	67.798	40
40	11	67.798	15.474	3.714	3.714	7.428	3,25%	77.671	41
41	12	77.671	16.248	3.900	3.900	7.799	3,25%	88.248	42
42	13	88.248	17.061	4.095	4.095	8.189	3,25%	99.571	43
43	14	99.571	17.914	4.299	4.299	8.599	3,25%	111.685	44
44	15	111.685	18.809	4.514	4.514	9.028	3,25%	124.637	45
45	16	124.637	19.750	4.740	4.740	9.480	3,25%	138.475	46
46	17	138.475	20.737	4.977	4.977	9.954	3,25%	153.253	47
47	18	153.253	21.774	5.226	5.226	10.452	3,25%	169.025	48
48	19	169.025	22.863	5.487	5.487	10.974	3,25%	185.849	49
49	20	185.849	24.006	5.761	5.761	11.523	3,25%	203.787	50
50	21	203.787	25.206	6.050	6.050	12.099	3,25%	222.902	51
51	22	222.902	26.467	6.352	6.352	12.704	3,25%	243.264	52
52	23	243.264	27.790	6.670	6.670	13.339	3,25%	264.942	53
53	24	264.942	29.179	7.003	7.003	14.006	3,25%	288.014	54
54	25	288.014	30.638	7.353	7.353	14.706	3,25%	312.559	55
55	26	312.559	32.170	7.721	7.721	15.442	3,25%	338.661	56
56	27	338.661	33.779	8.107	8.107	16.214	3,25%	366.408	57
57	28	366.408	35.468	8.512	8.512	17.025	3,25%	395.894	58
58	29	395.894	37.241	8.938	8.938	17.876	3,25%	427.218	59
59	30	427.218	39.103	9.385	9.385	18.770	3,25%	460.482	60
60	31	460.482	41.058	9.854	9.854	19.708	3,25%	495.796	61
61	32	495.796	43.111	10.347	10.347	20.693	3,25%	533.275	62
62	33	533.275	45.267	10.864	10.864	21.728	3,25%	573.041	63
63	34	573.041	47.530	11.407	11.407	22.815	3,25%	615.221	64
64	35	615.221	49.907	11.978	11.978	23.955	3,25%	659.950	65
65	36	659.950	52.402	12.577	12.577	25.153	3,25%	707.368	66

*Source: data analysis in Excel made by the authors*

This model's primary benefits (*Table 2*) stand for several beneficiary outcomes from self-contribution in voluntary funds with a modest amount of money allocated on a yearly basis. Secondary effects reflect through the improvement of financial education of the new generations that are not professional investors. Third, non-professional investors or employees could achieve greater returns in less-risky but more liquid assets than they would probably have from the income on a vista account or money market instruments. Generally, on the initial investment of HRK 660k, a closing balance identifies HRK 707k on the bank account at 66. The main advantage this model proclaims is the explanation of simplified pattern as a personal contribution to the generating personal income. Potentially higher yield may be achieved if the financial products' investors could deal with the offerings on a larger scale. That way, they will have an opportunity to re-sell assets for a stipulated price on organised or private markets. To test whether this model is equivalent for the domestic financial industry, the authors will introduce an application of Smart PLS3 for a two-stage pension fund industry model.

3. FUNCTION OF SMART PLS3 FOR A TWO-STAGE PENSION FUND INDUSTRY MODEL

As a proactive conceptual framework, the authors address context-specific challenges in Smart PLS3 software. Potentially positive outcomes in testing peer validation as performance indicators for domestic voluntary funds could be a benchmark in real case studies. A similar conclusion provides an elegant solution to various practical problems of the decision-making process (Sarstedt et al., 2017) and other financial intermediaries (Oaks, n.d.). The software-integrated model successfully establishes a set of variables relevant to the mixed methods analysis for non-parametric data tests in the statistical analysis of voluntary pension funds. At this stage, the authors believe that the partial least squares path modelling equation (PLS-SEM) can be implemented as a decision-making factor for the new ordered model while estimating the complex cause-effect relationship in the pension funds industry. Furthermore, the model addresses several objectives as opportunities for understanding the increasing complexity by exploring the theoretical extensions of established theories, financial ratios or similar types of data inputs, latent variable scores for follow-up analyses and a theoretical framework from a prediction perspective (Hair et al., 2019). The implications of these findings are discussed in the authors' mixed-methods analysis for non-parametric data tests in the statistical analysis, which prescribes the use of the PLS Algorithm as a form of two different stances. Firstly, software directly measures variable, such as performance indicator in the voluntary fund. Secondly, short-range predictions in the Simple PLS voluntary model stand for short-term causality mechanism in which all variables aren't always directly observed (i.e. trend analysis) (Prado & Ph, 2020). Another promising finding was that that type of mechanisms includes many economic models based on inflation, forecasting and liquidity. In practice, these models identify the cause-effect mechanism, which develops an innovative approach towards the self-realising mechanism (Prado & Ph, 2020). For that purpose, the authors have shown Smart PLS Simple model as a peer towards peer (P2P) reflective model in the cascade moderator analysis. The two-stage construct (diagram) elaborates the position of participants in a simple model, such as closed-end voluntary funds (CEVF), open-end voluntary funds (OEVF), management team of the voluntary fund (MTVF) and institutional investors (II). The authors have implemented three leading positions (equities, bonds and others) in the net assets value (NAV) of five consecutive periods (2015-2019) for eight Croatian open-end and twenty closed-end funds on 31st December of each year within the model. The voluntary fund management team (MTVF) is explained through a mediating effect for which the professional management team defines favourable outcomes towards the institutional investors.

Figure following on the next page

Figure 1: Two-stage construct (diagram) for Simple PLS of Croatian voluntary pension funds
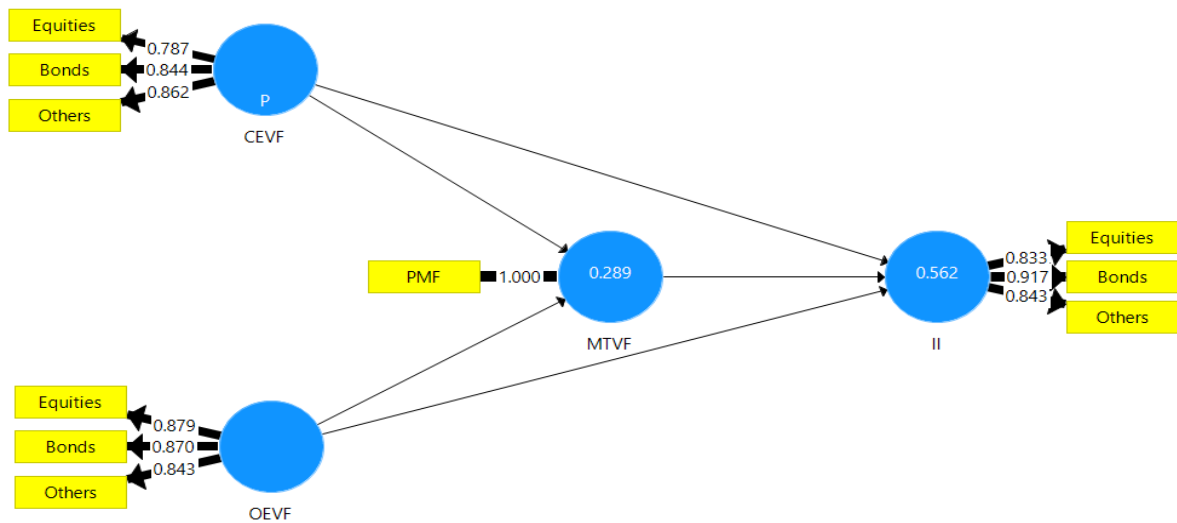
Source: authors' analysis in Smart PLS3 software, Boenningstedt: SmartPLS GmbH,
http://www.smartpls.com

The model's result has shown that all four indicators have cross-validated commonality with the original latent scores. Reflective relations in terms of decomposition of equities, bonds and others refer to outer models of the exogenous latent variables closed-end voluntary funds (CEVF) and open-end voluntary funds (OEVF). These results provide important evidence for the correlation of indicators of different participants while measuring the phenomena.

Table 3: Application of Path Coefficient as a two-stage construct for Croatian voluntary pension funds (extract from the table with 343 Samples)

	CEVF → II	CEVF → MTVF	MTVF → II	OEVF → II	OEVF → MTVF
Sample 0	-0,103	0,278	0,547	0,352	0,367
Sample 1	0,017	0,220	0,469	0,365	0,395
Sample 2	0,027	0,146	0,562	0,285	0,484
....					
Sample 170	0,065	0,196	0,491	0,321	0,409
Sample 171	0,127	0,285	0,480	0,177	0,395
Sample 172	0,082	0,145	0,452	0,306	0,450
....					
Sample 341	-0,065	0,147	0,515	0,397	0,457
Sample 342	0,128	0,106	0,431	0,361	0,437
Sample 343	-0,019	0,180	0,500	0,416	0,475

Source: authors' analysis in Smart PLS3 software, Boenningstedt: SmartPLS GmbH,
http://www.smartpls.com

The overall results have shown that PLS simple model generated by the model mechanism assesses the specific indirect effects of equities, bonds and others that are significant for our sample size (343) as case model *(Table 4)* for five periods (2015-2019).

Table following on the next page

Table 4: Specific indirect effects of Mean, STDEV, T-Values and values

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	p-values
CEVF → MTVF → II	0,082	0,080	0,033	2,482	**0,014**
OEVF → MTVF → II	0,214	0,212	0,034	6,221	**0,000**

*Source: authors' analysis in Smart PLS3 software, Boenningstedt: SmartPLS GmbH,
http://www.smartpls.com*

In *Table 5,* bootstrapping effects show the power of the direct impact of partial mediation. The immediate impact described by **p-values** of full mediation of the closed-end voluntary funds and institutional investors shows low significance (CEVF → II; 0,873). It could mean that they are internally more independent than other variables in the model from a practical standpoint.

Table 5: Path coefficients for indirect effects of Mean, STDEV, T-Values and values

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	p-values
CEVF → II	0,009	0,010	0,057	0,160	**0,873**
CEVF → MTVF	0,162	0,159	0,064	2,519	**0,012**
MTVF → II	0,504	0,500	0,041	12,235	**0,000**
OEVF → II	0,342	0,346	0,058	5,868	**0,000**
OEVF → MTVF	0,424	0,423	0,059	7,124	**0,000**

*Source: authors' analysis in Smart PLS3 software, Boenningstedt: SmartPLS GmbH,
http://www.smartpls.com*

Future research on the effects of exogenous variable partial mediation might extend the explanations of model significance and dependency within the allocation of different asset classes. As stated earlier, the case of Croatian voluntary pension funds might be improved with more data findings or indicators relevant for the analysis in Smart PLS3 software.

4. PROPOSAL FOR FUTURE ENDEAVOURS IN SMART PLS3 MODEL

The most significant limitation from the voluntary funds' vehicles reflects a limited transmission mechanism in terms of the nowcasting management fee for the voluntary fund's management team. The most significant number of arguments in the model refers to the unit price value as the voluntary fund's net asset value. On the one hand, Croatian voluntary funds in 2019 represent a majority shareholder structure in minority positions in shares, GDRs and blue-chip stocks while representing 24% of the assets in open-end voluntary funds. On the other hand, more than 64% of the open-end voluntary funds and 58% of the closed-end voluntary funds remain under the transfer regime of domestic and international corporate and government bonds. In that case, it shows a negative correlation of domestic and foreign government and corporate bonds with other types of assets' class in the voluntary funds. Regarding public acceptance for concerning experience before 2015, it is not easy to match the satisfactory return on invested capital with multiple limitations on the domestic market. Contrary to the case, forecasting could only tackle the limited frequency of data between lagged observations with the future outcome, i.e. financial derivatives (Bland, 2018). While taking these into the concrete scenario model for the Smart PLS3 software, future endeavours could target financial institution with larger data sets, i.e. compulsory pension funds.

Thus, the transmission mechanism will have enough time to self-adapt and react to the indicators linked to the operational, liquidity, credit and market risk. The authors will give their final remark in the last section, based on their own practical and personal experience with voluntary pension funds.

5. CONCLUSION

The authors are familiar with the domestic voluntary pension system's financial concept and business aspects, which supports the importance of long-term individual contribution as semi-public initiatives. Due to the current situation with a global pandemic, previously mentioned profound initiatives could become a legal framework and a realistic Croatian pension system strategy. The integrated regulatory strategy in terms of market offerings via private initiatives or privatisations could render even more domestic voluntary funds in terms of country-specific characteristics and sustainable institutional setup. These findings are consistent with several conclusions that have been drawn in the light of fine-tuning measures of the domestic voluntary pension funds for the last five consecutive periods. Participation in redistribution between Croatian obligatory and voluntary pension funds would not lurk benefits in terms of current returns and industry benchmark. It will adjust the possibility of privatisation as a trigger for the growth of valuation and consolidation of domestic listed and unlisted companies, as many Central and South-East Europe peers did. The innovative approach in detecting correlations between the current assets of closed-end and open-end funds with the presented and adopted debt and money market instruments could have multiple beneficiary outcomes. Future developments in these innovative models prove that new software packages (i.e. Smart PLS3) can contribute respectfully towards academia and business. More research is needed to apply and test private pension models with a different scope of independent variables in addition to application scenarios. These models' only limitation deals with new data sets and variables defined in favour of the simulation study or validity assessment.

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