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# Assessing the Impact of Pension Institutions on the Development of Global Finance

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## ABSTRACT

The novelty of the research lies in the conception of pension institutions as correctors of global financial development. These institutes do not only stimulate, but also slow down the positive change due to the particular assets allocation by largest pools, which are in fact represent a concentration of risks. This issue has not been taken under any comprehensive consideration at the global level yet. Thus, the aim of the research is to assess the pension institutions impact on long-term global financial development. The research concerns various problems: from specifying the position of pension institutions within the global finance hierarchy and “clusters of influence” allocation to empiric assessment of their impact on multiple indicators of global financial development; conclusions and prospects are formulated in the article as well. The article shows that pension institutions are the largest global investors with the core of the USA pension funds’ assets concentrated in the domestic stock market. The paper outlines the ways of the slowdown in the global financial development through to the pension funds in case of market and country risk realization.

**Keywords:** pension institutions; pension assets; pension funds; financial development indicators; Granger causality test; regression coefficient

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## INTRODUCTION

Traditionally, pension institutions have been perceived as a positive force driving financialization and financial innovation [1]. Until 2008, their direct impact on a number of financial variables (capitalization, volume of debt securities, information efficiency) and indirect impact on economic growth through more efficient channels of redistribution of financial resources were confirmed [2].

The focus of research has been predominantly on autonomous pension funds (hereinafter referred to as pension funds). It has been argued empirically that the size of pension funds is highly likely to explain differences in the rate of economic growth between countries [3] and has a positive impact on savings [4, 5].

The term ‘Pension fund capitalism’ was coined in the American literature, associated

with the large participation of pension funds in corporate governance, with increased disclosure requirements and with the growth of market efficiency [6].

Since the 2000s, the hypothesis about the positive impact of pension funds has been reconsidered. Its conditions are outlined: mandatory participation in funded schemes [7–10] and the presence of large funds [11].

It has been argued that the impact of pension funds is higher in countries with the case (precedent) law (UK, USA, Australia, Canada). Solidarity systems have no impact on financial development but can be supported by reforms to consolidate pension funds [12].

The year 2008 was a turning point regarding the impact of pension institutions: the dependence of pension systems on global dynamics increased and the opinion that pension reforms are likely to have



a negative effect given the cyclical nature of the global economy was confirmed [13–15].

During the first wave of reforms from 1994 to 2008, with the transition to private pension schemes, the number and the size of assets of pension funds increased manifold [16]. After 2008, it has been suggested that they offer excess demand for certain financial products (high return, low risk), leading to lower returns and speculative bubbles [13].

Many empirical studies assessing the impact of pension funds on the development of capital markets have been conducted between 2000 and 2010 [2]. The conclusions were drawn for a single country or a group of countries, the fact of influence was recorded without analyzing the causes and mechanisms that trigger them; the focus was mainly on the equity market. There have been no major studies in this area since 2010.

Thus, the purpose of this paper is to determine the place of pension institutions in global finance; to conduct a large-scale structural analysis to identify large pools of pension assets; to assess the mutual influence of their dynamics with the dynamics of financial development indicators; and to draw conclusions about the direction and nature of this influence, including the future prospects.

To solve these tasks and achieve the objectives, the full potential of the databases of the following organizations has been utilized: the OECD, World Bank, Securities Industry and Financial Markets Association (SIFMA), U.S. Federal Reserve as well as electronic platforms: Global Sovereign Funds (Global SWF.com), Hedge Fund Research (HFR.com), Information Agency on Exchange-Traded Funds ETFGI (Etfgi.com).

## MATERIALS AND METHODS

The study uses the OECD terminology and classification of organizational forms of pension assets [17]. A set of methods within the framework of systems analysis methodology is applied (Fig. 1).

1. *Defining the place of pension institutions in global finance*

1.1. The share of pension institutions in global finance (PI) is determined according to the formulas:

$$PI_{gfm} = \frac{PA}{GFM} \times 100\%, \quad (1)$$

$$PI_{gcm} = \frac{PA}{GM} \times 100\%, \quad (2)$$

$$PA = RSP + PPRF, \quad (3)^1$$

$$GFM = MCAP + GFIMO + FSD, \quad (4)$$

$$GCM = MCAP + GFIMO, \quad (5)$$

where  $PI_{gfm}$  (Pension Institutes in GFM) — is share of pension institutions in the global financial market;

$PI_{gcm}$  (Pension Institutes in GCM) — is share of pension institutions in the global capital market;

PA (Pension Assets) — assets of pension institutions;

GFM (Global Financial Market) — Global Financial Market;

GCM (Global Capital Market) — Global Capital Market;

RSP (Retirement Savings Plans) — assets in retirement savings plans;

PPRF (Public Pension Reserve Funds) — assets in state pension reserve funds;

MCAP (Market Capitalization) — equity market capitalization;

GFIMO (Global Fixed Income Markets Outstanding) — market value of bonds outstanding;

FSD (Financial System Deposits) — deposits in the financial system.

1.2. The place of pension institutions among other institutional investors is determined according to the formula:

$$PI_{in} = \frac{PA}{(IFA + PA + ICA + SWF + HDG + ETF)} \times 100\%, \quad (6)$$

where  $PI_{in}$  (Pension Institutes in Institutional Investors Assets) — share of pension assets in assets of institutional investors;

<sup>1</sup> Государственные пенсионные схемы с текущим методом поступлений и выплат не включаются.

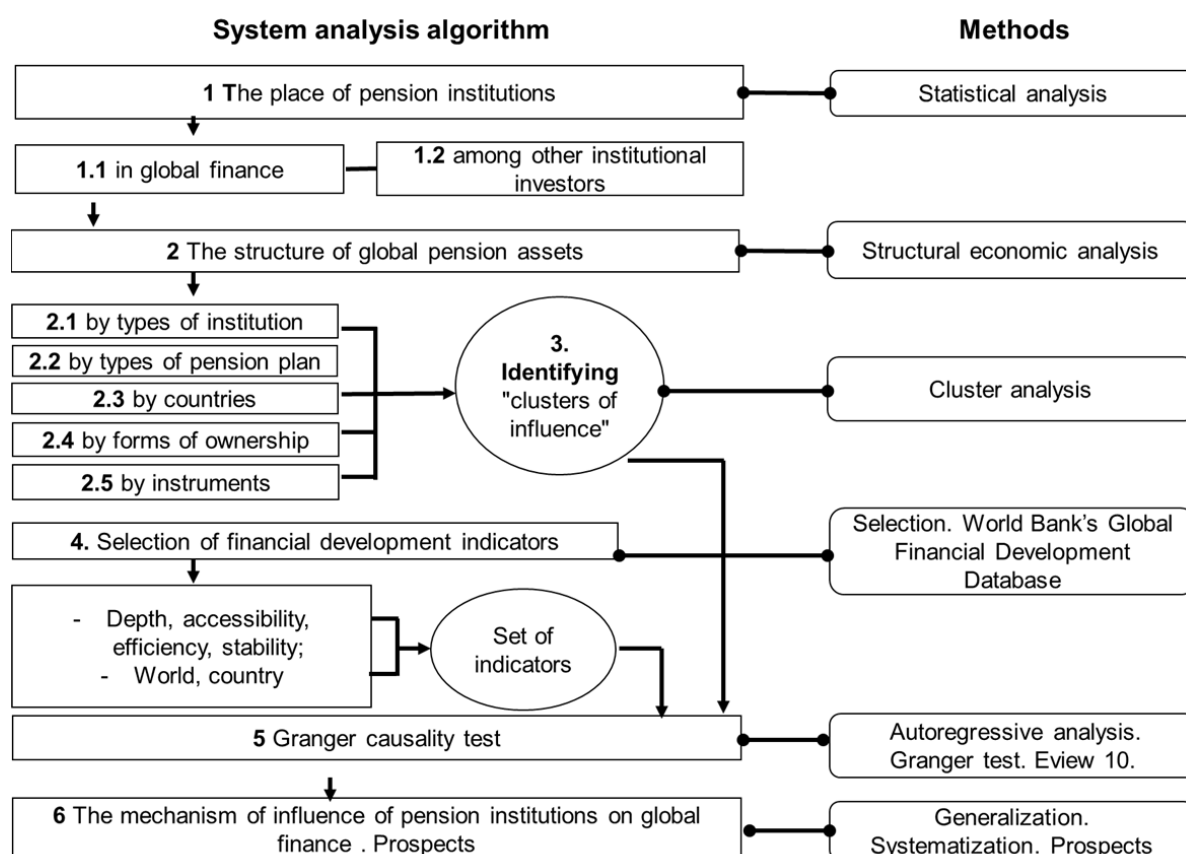


Fig. 1. General research strategy and research methods

Source: compiled by the author.

PA (Pension Assets) — assets of pension institutions, formula (3);

IFA (Investment Funds Assets) — Investment Funds Assets;

ICA (Insurance Corporations Assets) — Insurance Corporations Assets;

SWF (Sovereign Wealth Fund) — sovereign wealth fund assets;

HDG (Hedge Funds) — hedge fund assets;

ETF (Exchange Traded Fund) — ETF fund assets.

2. Analysis of the structure of global pension assets

2.1. The structure of global pension assets by types of institution [17] is determined according to the following formula:

$$PA(100\%) = PIC + APF + OTH + BR + PPRF, \quad (7)$$

where PA — Pension Assets;

PIC — Pension Insurance Contract;

APF (Autonomous Pension Funds) — pension funds;

OTH (Other) — other mechanisms;

BR (Book Reserves) — book reserves for pension liabilities;

PPRF (Public Pension Reserve Funds) — assets in public pension reserve funds.

2.2. The structure of pension institutions by countries is determined by the following formula:

$$PA_{AIF}(100\%) = C1_{AIF} + \dots + C7_{AIF} \dots 31OECD \dots + Oth_{AIF}, \quad (8)$$

where PA (Pension Assets) — Pension Assets, formula (3);

C1 — C7 — shares of pension funds assets in the top 7 OECD countries by asset size;

31 OECD — share of pension fund assets in the rest of OECD countries;



Oth<sub>AIF</sub> — share of pension fund assets in non-OECD countries.

2.3. The asset structure of pension funds by types of pension plan [17] is determined according to the following formula:

$$PA_{AIF} = DC_{AIF} + DB_{AIF} + PPP_{AIF}, \quad (9)$$

where PA<sub>AIF</sub> Pension Assets

DC<sub>AIF</sub> (Defined Contributions Autonomous Pension Funds) — assets in pension funds' defined contribution pension plans;

DB<sub>AIF</sub> (Defined benefits. Autonomous Pension Funds) — assets in pension funds' defined benefit pension plans;

PPP<sub>AIF</sub> Personal Pension Plans

2.4. The asset structure of pension funds by forms of ownership is determined by the following formula:

$$PA_{AIF} = GLPF + FPF + PRPF, \quad (10)$$

where PA<sub>AIF</sub> Pension Assets;

GLPF (Government and Local Pension Funds) — assets in government and local pension funds;

FPF (Federal Pension Funds) — assets in federal pension funds;

PRPF (Private Pension Funds) — assets in private pension funds.

2.5. The asset structure of pension funds by instruments is determined according to the following formula:

$$PA_{AIF} = SH_{AIF} + CB_{AIF} + G\&MB_{AIF} + MF_{AIF} + L_{AIF} + C\&D_{AIF} + Repo_{AIF} + Others, \quad (11)$$

where PA<sub>AIF</sub> (Pension Assets);

SH (Shares) — pension assets invested in shares;

CB (Corporate Bonds) — pension assets invested in corporate bonds;

G&MB (Government Bonds) — pension assets invested in state and municipal bonds;

MF (Mutual Funds) — pension assets invested in mutual investment funds,

L (loans) — pension assets in the form of loans issued;

C&D (Cash and Deposits) — pension assets in currencies and deposits;

Repo — pension assets in repurchase agreements.

OTH — pension assets in other instruments.

3. Identifying “clusters of influence” of pension institutions

Based on the results of the structural analysis (item 2 of Fig. 1), the largest pools of pension assets are identified using the hierarchical clustering method. Three levels of hierarchy, 5 groups, 58 objects are considered (Fig. 2).

The maximum object selection function is used ( $F_{\max}$ ).

$$x_z = F_{\max} \sum_{i=1960}^{2020} O_{ji}, \quad (12)$$

where:  $x_z$  — “cluster of influence”, the largest asset size facility in the group over the observation period;

$O_j$  — object in the group with order number  $j$  (pension asset pool).

Features of the function:

- is applied sequentially to each object ( $O_j$ ) (index  $j$  denotes the ordinal number of the object in the group);

- the object is considered in the dynamics of the available period no later than from 2004 and no earlier than 2018, index  $i$  denotes year  $i > 15$ ;

- the result of the function implementation ( $F_{\max}$ ) is the selection of the object with the maximum value in the group by the sum of years for the period under consideration ( $x_z$ ), index  $z$  denotes the group number (Fig. 2);

- $x_z$  is deemed insignificant for the analysis if the share of this object ( $O_{j_{\max}}$ ) in the total assets of the group ( $z$ ) for the whole period is less than 30%.

4. Selection of financial development indicators

The World Bank's Global Financial Development Indicators Database is used. As of mid-2022, it included 217 countries and 114 indicators from 1960 (later in some respects) to 2020.

The World Bank uses a  $4 \times 2$  “indicator matrix”. These are 4 areas of assessment

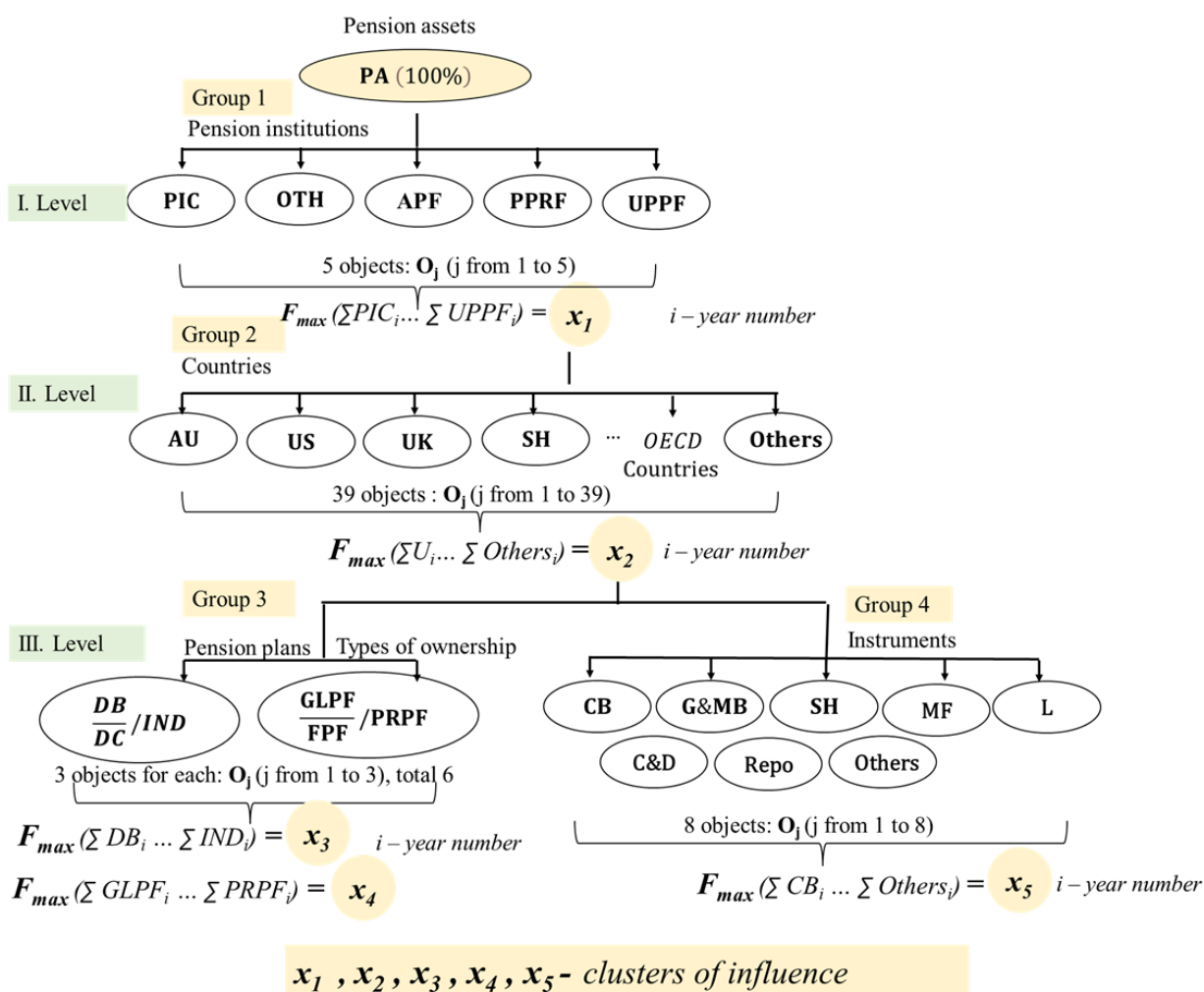


Fig. 2. Algorithm of the cluster analysis\*

Source: compiled by the author.

\* Note: the symbols from the formulas apply (5)–(8).

(financial depth, accessibility, efficiency, and stability) and 2 blocks (financial institutions and markets) [18]. The areas of assessment are not interlinked: financial depth of the systems does not mean accessibility of financial services, and market efficiency does not guarantee greater stability [18].

In each quadrant of the matrix, key indicators – benchmarks – are highlighted. The quantitative distribution of indicators across the matrix (highlighting the benchmarks) is presented in Table 1 [19].

The selection of indicators from the database is determined by:

- coverage of indicators across the 4 quadrants of the matrix, with the mandatory presence of benchmarks highlighted by World Bank;
- inclusion of indicators covering a wide range of financial institutions;
- the duration and continuity of the series: beginning – no later than 2004, ending – no earlier than 2018.

For each of the selected indicators, following the formula (13) country indicators are aggregated into global ones.

$$I_{world(i)} = \frac{\sum_{s=1}^n I_{s(i)} \times GDP_{s(i)}}{\sum_{s=1}^n GDP_{s(i)}}, \quad (13)$$



where  $I_{\text{world}(i)}$  — the calculated value of the indicator for the world as a whole in year  $i$ ;

$I_{s(i)}$  — indicator value for country  $s$  in year  $i$ ;

$\text{GDP}_{s(i)}$  — the GDP value of country  $s$  in year  $i$ .

#### 5. Autoregression analysis. Granger test.

The impact of the “clusters of influence” (item 3 of Fig. 1) on the financial development indicators (item 4 of Fig. 1) is investigated by a time series autoregressive analysis using the Granger causality test. The software product is — EViews 10.

Granger test has been used by the IMF and the World Bank to analyze the relationship between economic efficiency and economic growth [20], the dynamics of wheat prices and credit volumes to the private sector [21], the components of the money supply and inflation.

The time series analysis algorithm is shown in Fig. 3 [19].

#### 6. Drawing conclusions and forecasting the impact of pension institutions on global finance.

Based on the results of the analysis (pp. 1–5 of Fig. 1), the conclusions are arrived upon, the mechanism of influence of pension institutions on global finance is formulated, and the prospects for global financial development under the influence of the pension industry in a deteriorating economic environment are outlined.

## RESULTS AND DISCUSSION

1.1. Pension institutions with \$ 63.2 trillion in assets, formula (3) represent 1/5 of the global financial market, formula (1) and 1/3 of the global capital market, formula (2) [17].

The core of pension assets are the retirement savings plans (RSPs). Out of the \$ 56.4 trillion of RSPs, \$ 54.1 trillion (97%) — are accumulated in OECD countries, while in 54 non-OECD countries, — only \$ 2.3 trillion (Table 1).

1.2. Pension institutions, with \$ 63.2 trillion in assets in 2020, were the largest group of institutional investors (36%) (Table 1).

Without the Public Pension Reserve Funds (PPRFs), they would account for 31–33% of institutional investors' assets.

In 2nd place are assets of investment funds (\$ 60 trillion (34.5%)), followed by assets of insurance companies — \$ 33 trillion (19%) and sovereign wealth funds — \$ 10 trillion (5.7%).

The dynamics since 2008 show a stable position of pension institutions and sovereign wealth funds, with a mirrored rapid (since 2011) decline in the share of insurance companies and growth of investment funds' assets.

Hedge funds and ETFs have been actively growing since 2011, but their share is relatively small (Table 1). [17].

2.1. 64% of pension savings plan assets, formula (3), in OECD countries are accounted for by pension funds and 24% — by “other vehicles” (Table 2).

In 48 non-OECD countries, 95% of assets are represented by pension funds. In the OECD, 13 out of 38 countries have “other vehicles”. 90% of their assets are represented by the U.S. market and 8% — by the Canadian market [17].

Pension insurance contracts are in third place (12%) (Table 2). There is considerable variation from country to country: in France, they account for 79 per cent, in Sweden — 84 per cent, in Denmark — 66 per cent, in Belgium — 64 per cent, in Korea — 52 per cent and in Portugal — 42 per cent.<sup>2</sup>

In 4th place (1%) — are balance sheet reserves (Table 2). They are available in Canada (7%), Japan (17.7%), Spain (4.2%) and Sweden (9.2%).

Under the influence of the United States [17], the share of pension funds assets in the dynamics is decreasing (in OECD countries: from 71 per cent in 1995 to 64 per cent in 2020), and the share of “other mechanisms” is growing (from 16 to 24 per cent) (Table 2).

In the USA, the share of pension funds decreased from 79 to 57 per cent over the period from 1981 to 2020, the share of pension insurance agreements decreased from 18 to 10 per cent, and the share of other mechanisms increased 10 times from 3.2 to 32 per cent. Without the United States, the decline in the share of pension funds assets in

<sup>2</sup> The OECD statistics are given as the share of private pension plans. Terminology commentary is available on an external resource [17].

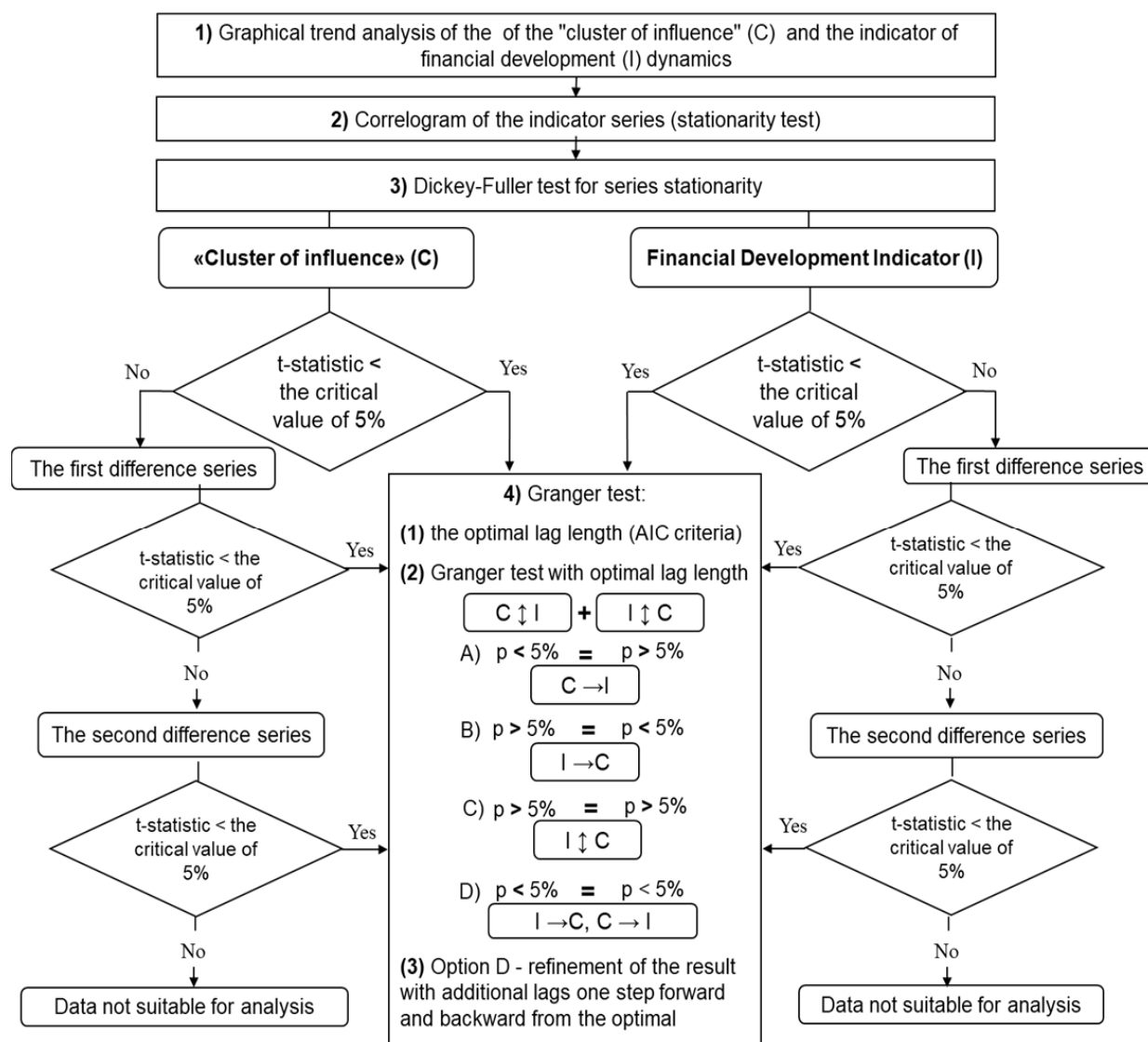


Fig.3. Algorithm of Granger causality test conduction

Source: compiled by the author.

other countries was accompanied by the growth of the share of pension insurance contracts (not “other mechanisms”) [17].

The analysis, formula (7), allows to identify one cluster of influence — these are the pension funds of OECD countries with \$ 34.5 trillion in assets (60% — are under the U.S. legislation) (hereinafter — Cluster 1).

A significant portion of pension assets — \$ 12.8 trillion (90% under the U.S. law) — is represented by “other vehicles” in the form of funds (accounts) managed by banks and investment companies. They are not singled out as a separate cluster due

to the significantly smaller size of pension fund assets over the history of observation. The shift in favour of the “other vehicles” ratio of pension assets lays down a long-term projection trend for the future impact of pension institutions on global finances.

2.2. In Cluster 1, there is a high concentration of assets (92%) in the first seven countries by 2020: the USA (59%), the UK (10%), the Netherlands (6%), Australia (5%), Canada (5%), Switzerland (4%), Japan (3%). Over the past 20 years, their share fell from 95% to 91% in 2001–2003, and has remained at 92% in 2007–2009 and beyond. The assets of



Table 1

**Pension assets and other institutional investors' assets, trillion of dollars\***

No.	Investors	2008	2010	2012	2014	2016	2018	2020
1	Pension institutions (PA)	27.9	34.9	39.2	42.5	45.5	50.6	63.2
	Of these: Retirement savings plans (RSP)	23.6	30.1	34.0	38.8	40.1	44.6	56.4
	Including OECD	23.0	29.1	32.8	37.3	38.4	42.7	54.1
	Public pension reserve funds (PPRF)**	4.3	4.8	5.1 (2011)	5.3 (2013)	5.4 (2015)	6.0	6.8
2	Investment funds (1)	20.4	25.7	34.4	40.3	41.1	46.8	59.6***
3	Insurance companies (ICA) (1)	22.1	25.8	25.8	27.8	27.2	28.8	33.0
4	Sovereign wealth funds (SWF)	4.0	4.8	6.1	7.4	7.5	8.4	9.9
5	Hedge funds	1.5	1.4	1.5	2.0	2.4	2.9	3.8
6	ETF	0.5	1.0	1.3	2.0	2.5	3.4	5.5
7	Total	76.4	93.6	107.0	122.0	124.5	139.0	175
8	Share of pension institutions (PA), %	36.5	37.3	36.6	36.1	36.5	36.4	36.1

Source: Pension market in focus OECD, 2021; Pension market in focus: preliminary 2021 data on pension funds, OECD, 2022; Pension at a Glance, OECD, 2013, 2015, 2017, 2019; Global SWF, HFR, ETFGI.

Note: \* abbreviated; \*\* for 38 OECD countries; \*\*\* preliminary data. For Australia, Chile, Latvia, the Netherlands, Norway, Poland, Portugal, Slovakia, the UK – it is calculated as the 2019 value multiplied by the GDP growth rate for 2020.

Table 2

**Allocation of assets in Retirement Savings Plans by pension institutes in dynamics (OECD), % \***

Year	Autonomous Funds (AIF). Cluster 1	Book Reserves (BR)	Pension insurance contracts (PIC)	Others (OTH)	Total
1995	71.2	0.0	12.7	16.2	100
2000	71.0	0.7	11.0	17.3	100
2005	70.1	0.9	11.9	17.1	100
2010	68.7	0.8	11.6	18.9	100
2015	66.2	0.5	11.8	21.6	100
2020	63.7	1.0	11.7	23.6	100

Source: Pension indicators database.

Note: \* abbreviated.

the other countries' pension funds (after the first seven) individually represent less than 1% [17].

The BRICS group of countries stands out, as do Singapore and Hong Kong, (China): from 2001 to 2020, their pension funds were among the top 25

countries in terms of assets. The leaders in growth are the pension funds of India (87 times the size of assets since 2013) and China (6 times). However, in absolute terms, they are 80 times smaller than the assets of the U.S. pension funds [17].



Table 3

**Structure of U.S. pension funds (Cluster 2) according to the retirement savings plan, formula (9)\***

	Indicator	1981	1985	1990	1995	2000	2005	2010	2015	2020
1	Assets in DC plans as a% of occupational plans assets	20.7	23.6	26.9	30.3	36.2	38.0	40.8	43.4	47.5
2	Assets in DB plans as a% of occupational plans assets	79.3	76.4	73.1	69.7	63.8	62.0	59.2	56.6	52.5
3	Assets in occupational plans, including	0.9	1.8	2.7	4.8	8.0	9.7	11.0	14.2	20.2
4	Assets in DC plans, trillion USD. [1/100 × 3]	0.2	0.4	0.7	1.5	2.9	3.7	4.5	6.2	9.6
5	Assets in DB plans, trillion USD. [2/100 × 3]	0.7	1.4	2.0	3.4	5.1	6.0	6.5	8.0	10.6
6	Individual plans, trillion USD, including:	0.2	0.7	1.7	3.0	5.1	6.8	9.2	12.7	19.1
6.1	Individual plans (managed by insurance companies), trillion USD.	0.1	0.3	0.6	0.9	1.4	1.9	2.3	2.9	3.8
6.2	Individual plans (as part of other mechanisms), trillion USD.	0.1	0.5	1.2	2.1	3.7	4.9	6.9	9.8	15.3

Source: Pension indicators database.

Note:\* abbreviated.

The U.S. investment funds — the cluster of influence of pension institutions on the global financial market with the size of assets of 20.2 trillion dollars (hereinafter — the Cluster 2) that has been operating throughout the history of observation.

2.3. Pension funds in the United States, like those in most OECD countries, serve occupational pension plans, which are divided into defined benefit (DB) and defined contribution (DC) plans [17]. Individual pension plans are implemented by insurance companies and “other mechanisms”, they are not subdivided into DC and DB plans.

The asset share of DC plans is growing in momentum. By 2020, parity has been reached between the two (Table 3). Historically, DB plans may have had a greater impact on global financial market development (the sum of assets over 1981–2020 is greater than that of DC plans).

It is not appropriate to distinguish a separate Cluster of influence within DC- or DB-plans. The

reallocation of the U.S. pension fund assets to DC plans forms a long-term projection trend.

2.4. The structure of Cluster 2 (US pension funds) by private and public<sup>3</sup> funds, formula (10), also confirms the equal asset allocation between them (Table 4). The transition of assets from public funds continues: 58.1% (1945) — to 40.9% (2021) — to private funds: 41.9% (1945) — to 59.1% (2021).

Legislative regulation of private and public pension fund investments in the U.S. is similar. Portfolio investment limits and management principles for private funds are set by the Employee Retirement Income Security Act of 1974 (ERISA), and for state and municipal funds by laws and regulations that are often based on ERISA. It is not appropriate to separate the Cluster as part of public or private funds.

2.5. The main asset class used for investment of U.S. pension funds (Cluster 2) — is equity. The share of equities (asset-weighted average) for

<sup>3</sup> Including federal, state, and local funds.

Table 4

## U.S. pension funds' assets allocation by public and private institutions\*

	Federal pension funds (FPF) <sup>a</sup>	State and local pension funds <sup>b</sup>	Private pension funds (PRPF)	Total assets <sup>c</sup>	Assets according to OECD data (reference)	FPF share,% [2/5]	GLPF share,% [3/5]	PRPF share,% [4/5]	Share of public funds (total),% [7+8]
	1	2	3	4	5	6	7	8	9
1945	2.9	2.5	3.9	9.3	-	31.2	26.9	41.9	58.1
1955	10	10.9	19.3	40.2	-	24.9	27.1	48.0	52
1965	19.7	34.0	79.0	132.7	-	14.8	25.6	59.5	40.5
1975	42.1	104.0	240.8	386.9	-	10.9	26.9	62.2	37.8
1985	172.1	413.1	1196.8	1782.0	1828.1	9.7	23.2	67.2	32.8
1995	532.5	1369.0	2770.8	4672.3	4833.0	11.4	29.3	59.3	40.7
2005	1072.1	3129.4	5383.1	9584.6	9664.4	11.2	32.7	56.2	43.8
2015	1976.2	4017.4	7798.4	13 792.0	14 173.7	14.3	29.1	56.5	43.5
2020	2744.8	5494.9	11 806.2	20 045.9	20 229.6	13.7	27.4	58.9	41.1
2021	2819.3	5929.5	12 618.5	21 367.3	-	13.2	27.8	59.1	40.9

Source: Reports Z1 ФПС (Historical Annual Tables. L 118, L 119, L.120); Pension indicators database.

Note: \* abbreviated; a, b Assets of U.S. pension funds as reported by the Fed (all assets, that are before 2014, are accounted for on an operational-accounting basis, all assets after 2014 – are accounted for on an actuarially based method, net of claims on contributions not yet received); c The amount of the U.S. pension funds' assets according to OECD data (including the amount of contribution-financed investments). The difference (columns 4 and 5) is due to accounting systems.

1945–2021 — was 36%, mutual funds — 22%, state, municipal (and foreign) bonds — 16%, other instruments — 10% [17].

US pension funds are increasing their appetite for risk. From 1.5% (1951), the share of investments in equities rose to 44% (1972) and remained at 35–42% until 2021. The share of investments in mutual funds increased continuously: from 0.2% (1962) to 28% (2017) and remained at 27% thereafter. Investments in other assets have been growing rapidly since 1985, most of them are alternative instruments [17].

Against this background, investments in government and municipal bonds have fallen from 78.5% (1945) to 14.5% (1972) and further to 13–23% and, since 1974, investments in corporate bonds fell from 30% in 1974 to 6% in 2004 and further to 10%.

Public pension funds hold most of their assets in equities (40%). Excluding federal funds (30% of all public funds by asset size) — there are traditionally a lot of volunteers to invest heavily in domestic

government bonds — the share of investments in equities would rise to 52% (asset-weighted average for 1945–2001). [17].

By comparison, *private pension funds* had 84% of all assets that were riskier. Investments in equities were 36 per cent, investments in mutual funds — 33 per cent and other instruments — 15 per cent [17].

The U.S. pension legislation does not limit foreign investments of pension funds [22], but, according to the World Bank, their share is low — about only 10% of assets [23]. In the United Kingdom, 20–25% of pension funds' assets were invested in foreign instruments until 2015, afterwards — only 13% (2020); in the Netherlands — 80–90%, in Canada — 22–35%; in Switzerland — 4.5–8% until 2008, further — up to 41% (2020).<sup>4</sup>

US pension funds hold a greater share of assets in domestic equities than other countries: 85% (2001), 77% (2005), 70% (2009), 63% (2014), 60.1%

<sup>4</sup> OECD. Funded Pension Statistics: Pension fund foreign investments.

(2020), 63% (2021). For the next six countries following the US, the figure was: 55% (2001), 51% (2009), 34% (2020). For the U.S. domestic fixed income instruments, this share is even higher: 100% in 2001 and 86.6 in 2021.

The U.S. financial market is large and offers a lot of opportunities for asset diversification, but the concentration on one type of instrument in one national market results in increased country risk.

US equities act as the main overseas investment for pension funds of other OECD countries: 60% in 2001, 54% in 2005, 52% in 2009, 49% in 2014 and 46% in 2020 (for bonds, respectively, 13, 11, 39, 37, 34%).<sup>5</sup> The share of alternative instruments (for pension funds of the seven first countries in terms of pension assets), although increasing from 5% in 2021 to 27% in 2016, has returned to 19% by 2021 (as in 2011).<sup>6</sup>

U.S. pension funds demonstrate long-lasting super-concentration of pension assets (hereafter Cluster 3, the impact of which is important to investigate at both the global and national levels).

3. The following clusters of influence are identified based on the results of the structural analysis (paragraphs 2.1–2.5):

- Cluster 1. “Pension funds of OECD countries”. [\$ 34.5 trillion (2020)], 60% of them under the U.S. legislation);
- Cluster 2. “US pension funds”. [\$ 20.2 trillion (2020)];
- Cluster 3. “US pension funds’ equity investments” [\$ 6.7 trillion (2020)].

Two levels of their impact are identified — global and national (US).

4. To analyze the impact of pension institutions on the global financial market, 20 financial development indicators were selected from the World Bank Database according to the criteria specified in clause 4. [19]. Each indicator is

considered at the global, formula (13), and national levels.

5. An autoregression analysis carried out according to the methodology (item 5) reveals the impact of the dynamics of the U.S. pension funds’ assets (including those invested in equities) on 10 of 20 financial development indicators (at the global and national levels) in four areas: depth (5 of 8 indicators), affordability, efficiency, and stability (2 of 4 indicators in each) (*Table 5*) [19].

Table 5 shows that the main sphere of influence is the equity market (value, yield, volatility, turnover, followed by the value of the international public and private debt markets. The impact through institutions is represented by a smaller number of indicators, but they are linked to service availability benchmarks [19].

Data from regression analysis (regression coefficients) show that the asset dynamics of the U.S. pension funds have a stronger effect on the ratio of stock market total value traded to GDP. On average over the period, a 1% increase in pension funds’ assets leads to a 0.44% increase in the value of equities.

The situation is complicated by the existence of a reverse impact channel. A 1% increase in the value of equities on the global stock market leads to an 0.86% increase in the assets of the U.S. pension funds.

A 1% increase in pension funds’ assets would cause the stock market turnover ratio to rise by 0.38% and would cause capitalization to rise by 0.28%.

The value of outstanding international private debt securities is less affected. A 1% increase in assets leads to an 0.14% increase in A.M.1. For the same indicator in public debt securities — the impact is even less: a 1% increase leads to an increase of 0.008–0.009%. The impact of changes in U.S. pension funds’ assets on stock price volatility is insignificant — only 0.02–0.45% for a 1% increase in assets. The exception is the U.S. pension funds’ assets in equities. A 1% increase in equity investments would result in an average increase in volatility of 1.3%.

<sup>5</sup> OECD. Funded Pension Statistics: Pension fund foreign investments. Weighted average formula.

<sup>6</sup> Gilbert M. Pension Funds Would Benefit From Overseas Adventures. URL: <https://www.bloomberg.com/opinion/articles/2022-02-23/pension-funds-would-benefit-from-overseas-adventures> (accessed on 30.08.2022).

Table 5

## World Bank global financial development indicators influenced by U.S. pension funds dynamics

		M – markets				
			World	USA	Regression coefficient (world)	Regression coefficient (USA)
A. depth	A.M.1	Outstanding international private debt securities to GDP (%)	World	USA		
		U.S. pension fund assets	Yes	Yes	0.0017	0.0014
		U.S. pension fund assets in equities	Yes	Yes	0.005	0.0041
	A.M.2	Outstanding international public debt securities to GDP (%)	World	USA		
		U.S. pension fund assets	Yes	No	0.0001	-
		U.S. pension fund assets in equities	Yes	No	0.0003	-
	A.M.4	Stock market total value traded to GDP (%)	World	USA		
		U.S. pension fund assets	Yes *	Yes *	0.0068	0.0151
		U.S. pension fund assets in equities	Yes *	Yes *	0.02	0.0437
	A.M.5	Stock market capitalization to GDP (%)	World	USA		
		U.S. pension fund assets	Yes	No	0.0044	-
		U.S. pension fund assets in equities	Yes	No	0.013	-
B. access	I – institutions					
	B.I.1	Bank accounts per 1,000 adults	World	USA		
		U.S. pension fund assets	Yes	Yes *	0.0051	0.0076
		U.S. pension fund assets in equities	Yes	Yes *	0.0135	0.0223
	B.I.2	Bank branches per 100,000 adults	World	USA		
		U.S. pension fund assets	Yes	Yes	-0.001	-0.0005
		U.S. pension fund assets in equities	No	Yes	-	-0.0017
C. efficiency	M – markets					
	C.M.1	Stock market turnover ratio (%)	World	USA		
		U.S. pension fund assets	Yes	Yes	0.0057	0.0089
		U.S. pension fund assets in equities	Yes	Yes	0.0162	0.025
	C.M.2	Stock market return (% year-on-year)	World	USA		
		U.S. pension fund assets	Yes	Yes	-0.0011	-
		U.S. pension fund assets in equities	Yes	Yes	-0.003	-

Table 5 (continued)

		I – institutions				
D. stability	D.I.2	Bank capital to total assets (%)	World	USA		
		U.S. pension fund assets	No	Yes	0.0005	0.0007
		U.S. pension fund assets in equities	No	Yes	0.0017	0.0023
	M – markets					
	D.M.1	Stock price volatility	World	USA		
		U.S. pension fund assets	Yes	Yes	0.0002	0.0003
		U.S. pension fund assets in equities	Yes	Yes	0.0007	0.001

Source: [19].

Note: \* bilateral influence.

The weakest impact is on the Institutional Development Indicators (B.I.1) with an increase of only 0.33–0.88 accounts per 1000 population.

Demand for equities from U.S. pension funds contributes to lower equity market returns, but it is not possible to quantify the impact reliably in this case.

### CONCLUSIONS AND RECOMMENDATIONS

Pension institutions are the largest investors in the global financial market, with a core of U.S. pension funds: \$ 20.2 trillion.

Their peculiarity is the significance of investments in domestic equities, which are not replaced by investments in mutual funds and alternative instruments (the share of the latter is growing at the expense of a declining share of corporate and government bonds).

The trend of asset transfers from the U.S. pension fund pool (57% of pension assets in 2020) towards the pool of Individual Retirement Accounts (IRAs) (32% of assets) has not yet gained sufficient weight to change the situation. IRAs' investments in the U.S. domestic equities are on a par with those of U.S. pension funds, i.e., equities have a greater weight in the portfolio structure.<sup>7</sup>

<sup>7</sup> Data from the Investment Company Institute: Investment Company Institute. URL: [https://www.ici.org/faqs/faq/iras/faqs\\_iras](https://www.ici.org/faqs/faq/iras/faqs_iras) (accessed on 06.09.2022).

Autoregression analysis, including the Granger causality test, confirmed the impact of the U.S. pension fund asset dynamics on 50% of selected global financial development indicators. These indicators cover equity and bond markets and, to a lesser extent,— the banks.

The following mechanism of influence can be identified: an increase in the total value of exchange traded equities leads to an increase in the U.S. pension funds' assets. This effect is multiplied by the inverse effect of the pension funds' dynamics on this indicator. This is followed by an increase in equity market capitalization and the value of traded private debt securities with a small loss of multiplier effect.

A 1% change in the value of globally traded equities would also result in a 1% change in the size of pension assets (taking into account the multiplier effect). If pension assets decline, the turnover rate of the equity market slows down more quickly and the capitalization and value of the private bond market declines. To a lesser extent, the negative impact applies to government bonds.

Against the background of sustained and deep declines in indices (by a factor of 1.5 or more), the participation of pension funds in declining equity market returns and rising equity price volatility will be noticeable. This is the way to reduce the investment qualities of financial instruments.





A smaller, but noticeable (in a deep recession) contribution will be made to a reduction in the stability of the banking system and the availability of banking services.

Market risks in equities and the U.S. country risks are super-concentrated in the established mechanism of global influence of pension

funds. Collapsing stock markets, deteriorating economic conditions and changes in the U.S. pension and tax laws — are all important reasons for the decline in pension funds' assets. In the medium term, the active participation of pension institutions in the global financial slowdown looks almost inevitable.

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