"Empirical analysis of the impact of pension funds as institutional investors on the capital market"

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Short introduction

-theoretical and empirical presentation;

-period: 2010-2020;

-two models;

-E-Views;

-panel regression analysis;

-results

Importance of institutional investors

-important part of today's financial market;
-integral force in the capital market;

-main activity is collecting funds;
-generating income through their investment in securities of other issuers and financial instruments;

-value, activity and stability of the securities market;
-developed and emerging markets;
-globalization-international diversification;

-1980s-rapid increase in the importance of institutional investors;
-institutional-investment behavior: important for governments, policy makers, economists, academics etc.

Importance of pension funds
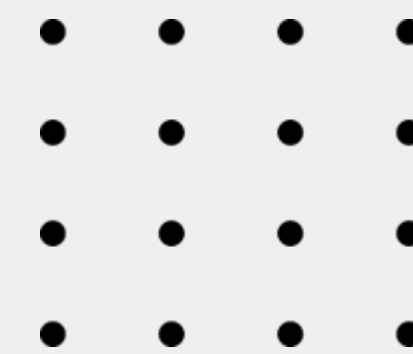
-largest and fastest growing institutional investors;

-dual role: saving for retirement & allocation of funds for innovation and growth;

-differences from one country to another;

-pension reforms are at the top of political agendas;

-reforms in the pension systems- due to unfavorable demographic developments, outdated and

unsustainable pension systems;

-development of capital market-stocks and bonds market;

-Well-structured pension systems-driving force for encouraging innovative projects, successful corporate

management and the development of the private sector;

-pension fund assets increase with growth through four channels: *savings, better corporate governance,*

good functioning of the labor market and through the *development of the capital market*;
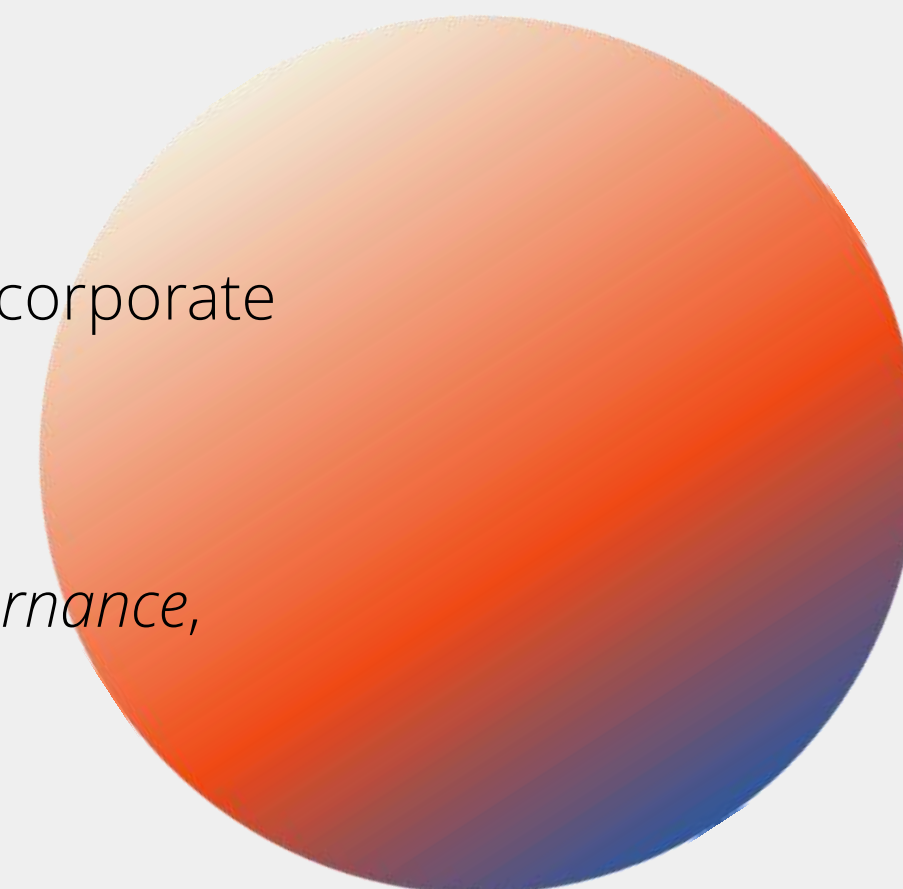
Importance of pension funds

-structure of a country's financial market-key factor on which a country's ability to realize greater benefits from pension funds depends;
-the greater the degree of economic development, the greater the role of pension funds;

Kim (2010): *the assets of pension funds differ from those of insurance companies because they are more liquid, and are usually more often invested in stocks than bonds.*

-positive and significant correlation between stock market development and economic growth.
Hence, the development of the stock and bond market can be directly linked to the growth of pension funds

Raisa (2012): *competitive investment advantage of pension funds is that no other investor can match their long-term nature and investment scale.*

-the greater their participation and exposure to the domestic markets through investment in private or government bonds, the more the development of the financial market will be stimulated

Impavido et al. (2000): *pension fund assets can contribute to increasing demand for stocks and bonds. Hence, an increase in pension fund investments increases market liquidity and trading volume.*
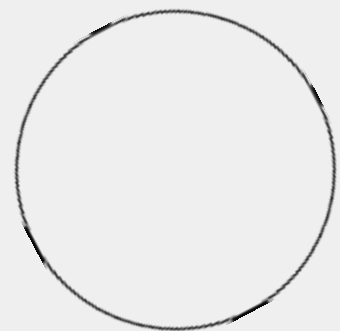
Investment activities of pension funds in infrastructure
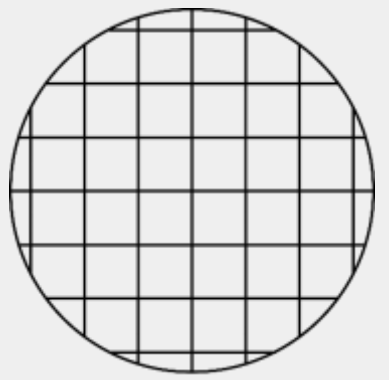
- -stocks, bonds, cash;

- -infrastructure projects: roads, utility lines, public buildings;-stable cash flows

- -regulatory reforms-easier investment conditions;

- -balance in terms of profile, risk, return and portfolio diversification;

Escriva, et al. (2010): investment of pension funds in infrastructure projects contributes to macroeconomic development;

Yun (2012): pension funds should increase their exposure to long-term infrastructure, especially healthcare, as this sector is considered a fast-growing industry and can generate high returns;
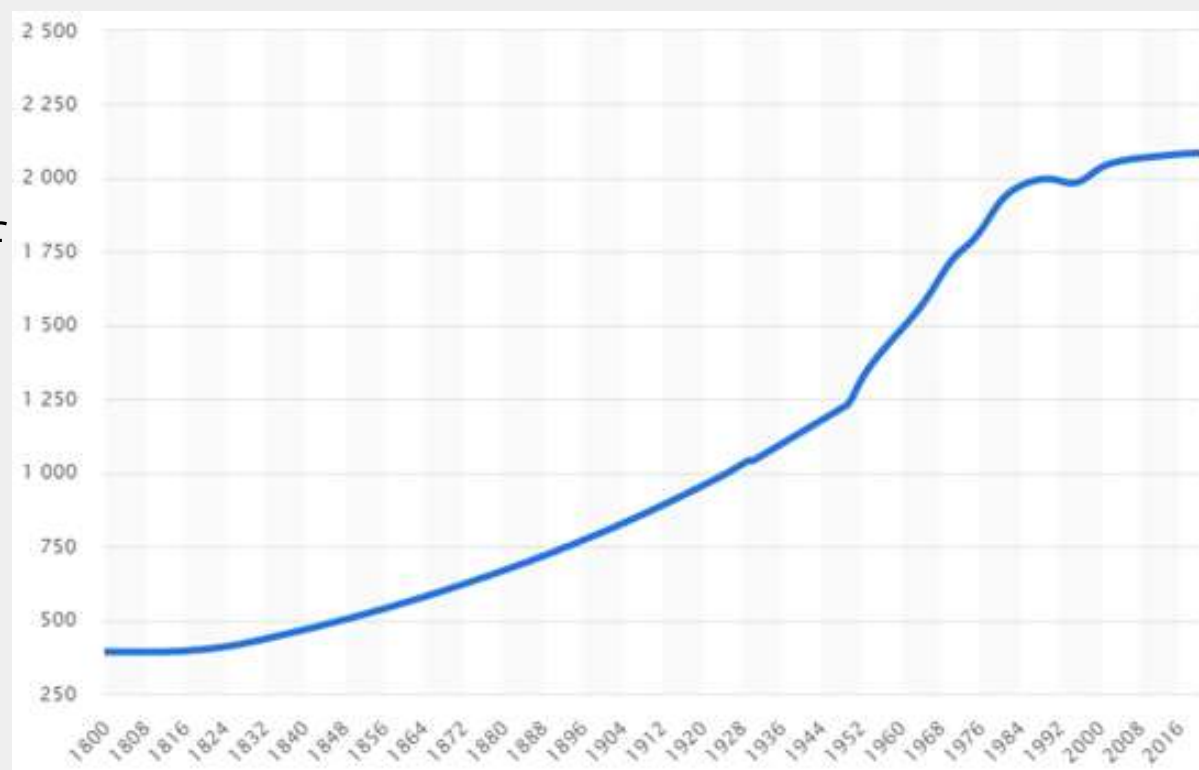
- -biggest challenge: low availability of high-quality investment projects;

- -developed countries: they have already completed the more profitable infrastructure projects;

- -developing countries: there is more room for the realization of infrastructure investments;

The pension system in N. Macedonia
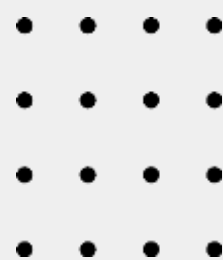
The population of N. Macedonia from 1800 to 2020

Population growth in Macedonia from 2010 to 2020

1 continuous development and upgrading

2 demographic factor-that had a great impact on the transformation of the pension system;

3 key factors: demographic changes, labor market movements & alignment of pensions with economic potential;

4 first pillar: covers the mandatory pension and disability insurance based on generational solidarity;

5 second pillar covers the mandatory capital-funded pension coverage;

6 third pillar covers the voluntary capital-funded pension insurance;

7 funds from three sources, thereby diversifying the risk

Index of sustainability of pensions

API-Allianz Pension Index: analyzes pension index in terms of sustainability and adequacy

↓

3 sub-indices

↓

30 parameters

↓

Scale 1-7

Financial and demographic characteristics-*starting point for any pension reform*

Sustainability-*measures how pension systems react to demographic change*

Adequacy-rates the adequacy of pension systems, questioning whether they provide an adequate standard of living in old age

This index assesses the long-term sustainability of national pension systems and provides an indication of the need to introduce pension reforms;

Financial and demographic characteristics ▬ 20%

Financial Leeway 40%

Demographic Change 60%

Determined by:
1. the current general government gross debt (30%)

+

2. today's public spending for old-age benefits (70%) in % of GDP

Old age dependency ratios

Sustainability ▬ 40%

Preconditions 60%

Demographic Change 60%

Composed of:
1. Preconditions (60%): retirement age (80%) + minimum contribution period (20%)
2. Finances (40%): financing (70%) + pension formula (30%)

Old age dependency ratios of 2019 (10%) and 2050 (40%) + percentage change of these two ratios (50%)

Adequacy ▬ 40%

First Pillar 50%

Other pension income 50%

1. Coverage (70%)
2. Benefit level (30%)

1. Second pillar (20%)
2. Financial assets (70%)
3. Gainful employment (10%)

Index of sustainability of pensions

Bulgaria	2020	
	rank	sum
API	9	3.16
Financial and demographic characteristics (20%)	32	3.8
Sustainability (40%)	2	2.67
Adequacy (40%)	36	3.33

Croatia	2020	
	rank	sum
API	46	4.05
Financial and demographic characteristics (20%)	55	4.7
Sustainability (40%)	38	4.1
Adequacy (40%)	40	3.69

Slovakia	2020	
	rank	sum
API	17	3.36
Financial and demographic characteristics (20%)	44	4.24
Sustainability (40%)	11	3.18
Adequacy (40%)	28	3.09

Romania	2020	
	rank	sum
API	50	4.12
Financial and demographic characteristics (20%)	37	3.88
Sustainability (40%)	48	4.4
Adequacy (40%)	44	3.98
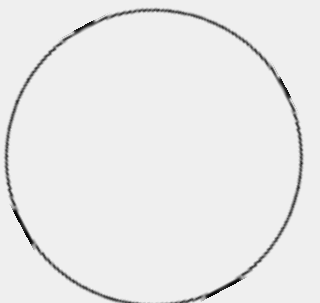
Pension funds and the capital market

structure and stability of the financial market

level of financial development

the greater the degree of financial development, the greater the influence of pension funds

advantage of pension funds compared to other institutional investors--- obligations they have

increased demand for stocks and bonds, increases the demand for various market instruments

multi-pillar system-N. Macedonia

creation of new instuments, modernization of infrastructure, better regulation

Hu (2012): positive relationship between pension fund assets and the capital market

Pfau (2010): pension funds positively affect the capital market, but only in countries that have a high degree of financial development

Sun and Hu (2014): every 1% increase in pension fund assets contributes to an increase of 0.15%-0.23% in the market value, and this is where the differences in financial development between countries lie

Investment portfolio of mandatory pension funds in N. Macedonia

Mandatory pension funds	2020	2019	2018	2017	2016	2015	2014
shares from domestic issuers	2.74%	3.04%	3.12%	3.12%	2.85%	3.22%	3.41%
investment funds from domestic issuers	0.02%	0.02%	0.25%	0.00%	0.00%	0.00%	0.00%
shares from foreign issuers	4.75%	5.72%	5.56%	5.46%	5.47%	5.41%	4.86%
bonds from foreign issuers	0%	0%	0%	1%	0%	0%	0%
monetary assets	0.09%	0.22%	1.72%	0.10%	0.11%	0.20%	0.18%
bonds from domestic issuers	59.75%	58.87%	57.38%	60.68%	60.25%	59.13%	57.99%
short-term papers from domestic issuers	0.03%	0.00%	0.00%	0.00%	0.66%	0.73%	0.00%
investment funds from foreign issuers	22.53%	21.11%	20.85%	21.87%	22.29%	22.13%	21.49%
deposits	9.89%	10.92%	11.02%	8.00%	7.73%	7.11%	10.98%
receivables	0.20%	0.10%	0.09%	0.15%	0.17%	1.85%	1.10%

Source: MAPAS (2021)

Investment portfolio of voluntary pension funds in N. Macedonia

Voluntary pension funds	2020	2019	2018	2017	2016	2015	2014
shares from domestic issuers	8.11%	8.59%	8.15%	8.50%	8.42%	9.70%	11.58%
investment funds from domestic issuers	0.01%	0.00%	0.77%	0.00%	0.00%	0.00%	0.00%
shares from foreign issuers	5.68%	6.22%	6.20%	6.07%	5.92%	5.30%	4.82%
bonds from foreign issuers	0%	0%	0%	1%	1%	0.00%	0.00%
monetary assets	1.06%	1.28%	2.63%	1.65%	1.57%	1.33%	2.95%
bonds from domestic issuers	49.06%	48.18%	47.05%	48.67%	48.63%	48.60%	43.99%
short-term papers from domestic issuers	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
investment funds from foreign issuers	21.90%	20.60%	20.66%	21.31%	21.77%	22.59%	21.79%
deposits	14.16%	14.94%	14.53%	13.10%	13.00%	12.48%	14.84%
receivables	0.02%	0.18%	0.02%	0.06%	0.05%	0.01%	0.04%

Source: MAPAS (2021)

Total assets of pension funds as % of GDP

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Macedonia	2.9	3.5	4.6	5.4	6.4	7.3	8.3	9.4	10	11.3	13.5
Greece	0	0	0	0.5	0.6	0.6	0.7	0.8	0.8	0.8	1
Croatia	11.6	12.9	16.2	18.4	21.2	23.2	25.4	26.5	27	29.9	34.6
Slovenia	4.8	5	5.2	5.3	5.6	5.7	5.7	5.7	5.6	5.9	6.6
Hungary	14.5	3.7	3.8	3.9	4	4	4.1	4.2	3.8	3.8	4
Romania	0.9	1.2	1.7	2.3	3	3.6	4.3	4.8	5.2	6.1	7.4

Source: Funded Pension Indicators OECD (2021)

- Pension funds:

reduce the cost of capital

lower prices of securities

increase trading volumes

reduce volatility

Pension funds and capital market development:

- Meng and Pfau (2010);
- Thom (2014);
- Kim (2010);
- Raisa (2012);
- Poirson (2007)

(Moleko and Ikhide, 2015):

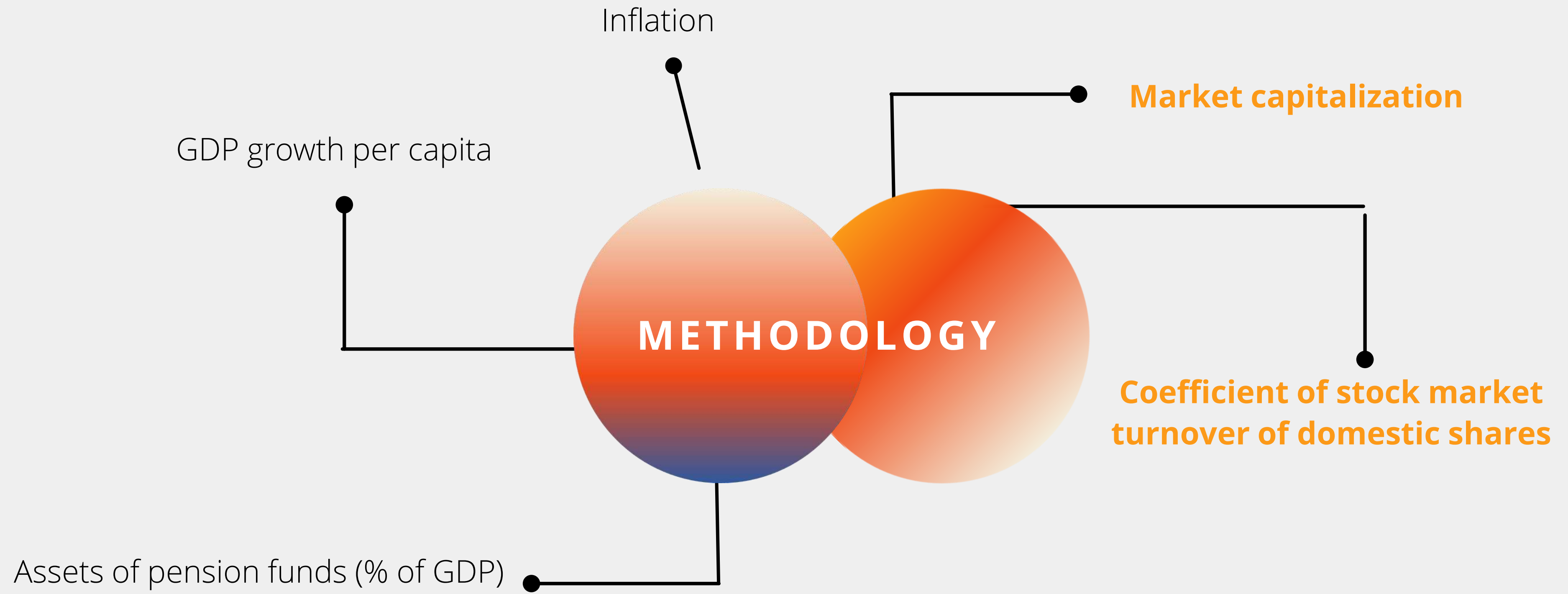Dependent: stock market capitalization (as proxy for stock market capitalization)

Dependent: Investment in Debt securities (as a proxy for private and public sector bond market capitalization)

Independent: inflation rate, private sector credit, GDP per capita, pension fund assets

(Su, et al. 2017):

Dependent: stock market capitalization (as proxy for stock market capitalization)

Independent: GDP per capita, stock market liquidity, inflation, domestic investment, FDI

METHODOLOGY

Inflation

GDP growth per capita

Market capitalization

Coefficient of stock market turnover of domestic shares

Assets of pension funds (% of GDP)

Model 1: MCit=constant + PFAit + GDPCGit + INFLit+ εit
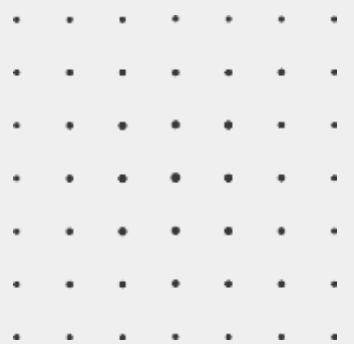**Model 2**: STTRDSit=constant + PFAit + GDPCGit + INFLit+ εit

Market capitalization: refers to the market value of a company's equity. It is calculated by multiplying a company's shares outstanding by its share price;

Domestic stock turnover ratio: shows the liquidity of the stock market, measures how easy the stock sells in the market

Pension fund assets: assets bought with the contribution to a pension plan for the exclusive purpose of financing pension plan benefits;

GDP per capita: shows a country's GDP divided by its total population. It acts as a metric for determining a country's economic output per each person living there;

Inflation: refers to the general increase in the prices of goods and services in an economy;

Model 1: MCit=constant + PFAit + GDPCGit + INFLit+ εit
Model 2: STTRDSit=constant + PFAit + GDPCGit + INFLit+ εit

Mcit-market capitalization as % of GDP

PFAit-pension fund assets

GDPCGit-GDP per capita growth

INFLit-inflation

STTRDSit-stocks traded, turnover ratio of domestic shares

Countries of interest:
- N. Macedonia
- Greece
- Romania
-Slovenia
- Croatia
-Hungary

Period: 2010-2020

Multicollinearity test

	MC	PFA	GDPCG	INFL
MC	1.000000	0.599533	-0.134839	-0.323880
PFA	0.599533	1.000000	0.093628	-0.159578
GDPCG	-0.134839	0.093628	1.000000	-0.078214
INFL	-0.323880	-0.159578	-0.078214	1.000000

	STTRDS	PFA	GDPCG	INFL
STTRDS	1.000000	-0.388732	-0.210703	0.181142
PFA	-0.388732	1.000000	0.052912	-0.161439
GDPCG	-0.210703	0.052912	1.000000	-0.101477
INFL	0.181142	-0.161439	-0.101477	1.000000

Stationarity test

If time series has a unit root, it shows a systematic pattern that is unpredictable;

H_0: Series has unit root;

Prob.<level of significance (1%, 5% or 10%)-H_0 is rejected.
Hence, the variable does not have unit root

Prob.>level of significance (1%, 5% or 10%)-H_0 is accepted.
Hence, the variable has unit root. Hence, it has to be differenced;

Stationarity test

MC

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-5.71204	0.0000	5	46
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-3.43389	0.0003	5	46
ADF - Fisher Chi-square	30.3513	0.0008	5	46
PP - Fisher Chi-square	36.6004	0.0001	5	46

STTRDS

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-8.94039	0.0000	5	42
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-4.74273	0.0000	5	42
ADF - Fisher Chi-square	43.0779	0.0000	5	42
PP - Fisher Chi-square	37.1538	0.0001	5	48

PFA

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-13.9746	0.0000	6	60
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-22.9033	0.0000	6	60
ADF - Fisher Chi-square	19.1148	0.0858	6	60
PP - Fisher Chi-square	19.0428	0.0875	6	60

GDPCG

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-3.29444	0.0005	6	60
Null: Unit root (assumes individual unit root process)				
ADF - Fisher Chi-square	22.9863	0.0278	6	60
PP - Fisher Chi-square	22.9057	0.0285	6	60

INFL

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-3.96203	0.0000	6	60
Null: Unit root (assumes individual unit root process)				
ADF - Fisher Chi-square	28.0614	0.0054	6	60
PP - Fisher Chi-square	28.5240	0.0046	6	60

Panel regression analysis

Model 1: with RE (Hausman test)

$MC_{it} = constant + PFA_{it} + GDPCG_{it} + INFL_{it} + \varepsilon_{it}$

-Probability of the independent variable is less than the level of significance (1%, 5%, 10%)

- PFA-positive and significant at 1% level

- GDPCG-positive and significant at 5% level

- INFL-negative and significant at 5% level

$R^2 = 58\%$, hence, 58% of the variability of the dependent variable is explained by the variability of the independent variables;

Granger causality: MC affects GDPCG (Model 1)- similar results in the paper of Levine (1991)

Model 2: with RE (Hausman test)

$STTRDS_{it} = constant + PFA_{it} + GDPCG_{it} + INFL_{it} + \varepsilon_{it}$

-Probability of the independent variable is less than the level of significance (1%, 5%, 10%)

- PFA-positive and significant at 5% level

- GDPCG-not significant

- INFL-negative and significant at 5% level

$R^2 = 81\%$, hence, 81% of the variability of the dependent variable is explained by the variability of the independent variables;

Graphic display of pension fund assets and market capitalization
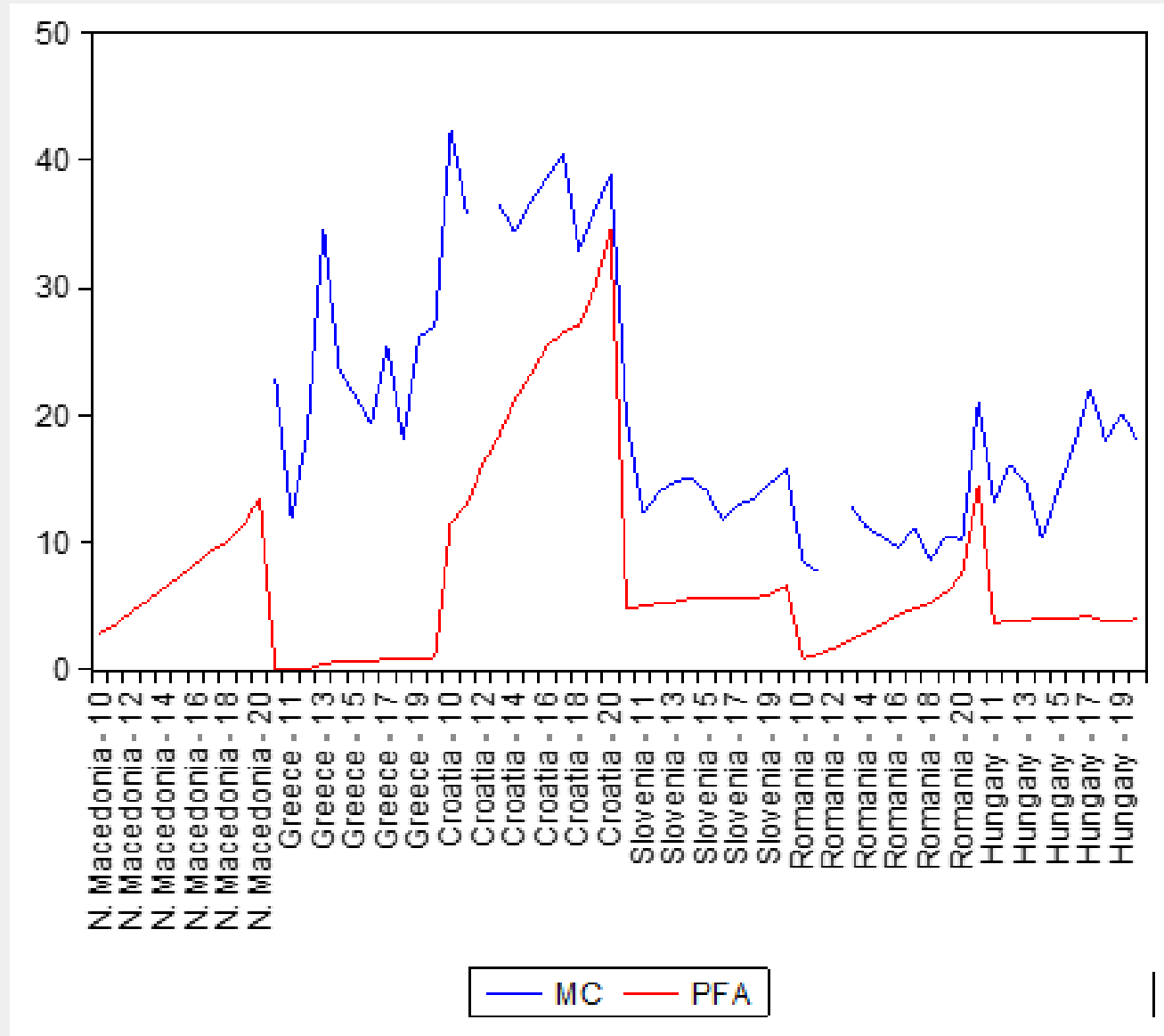

Graphical representation of pension fund assets and domestic equity trading ratio
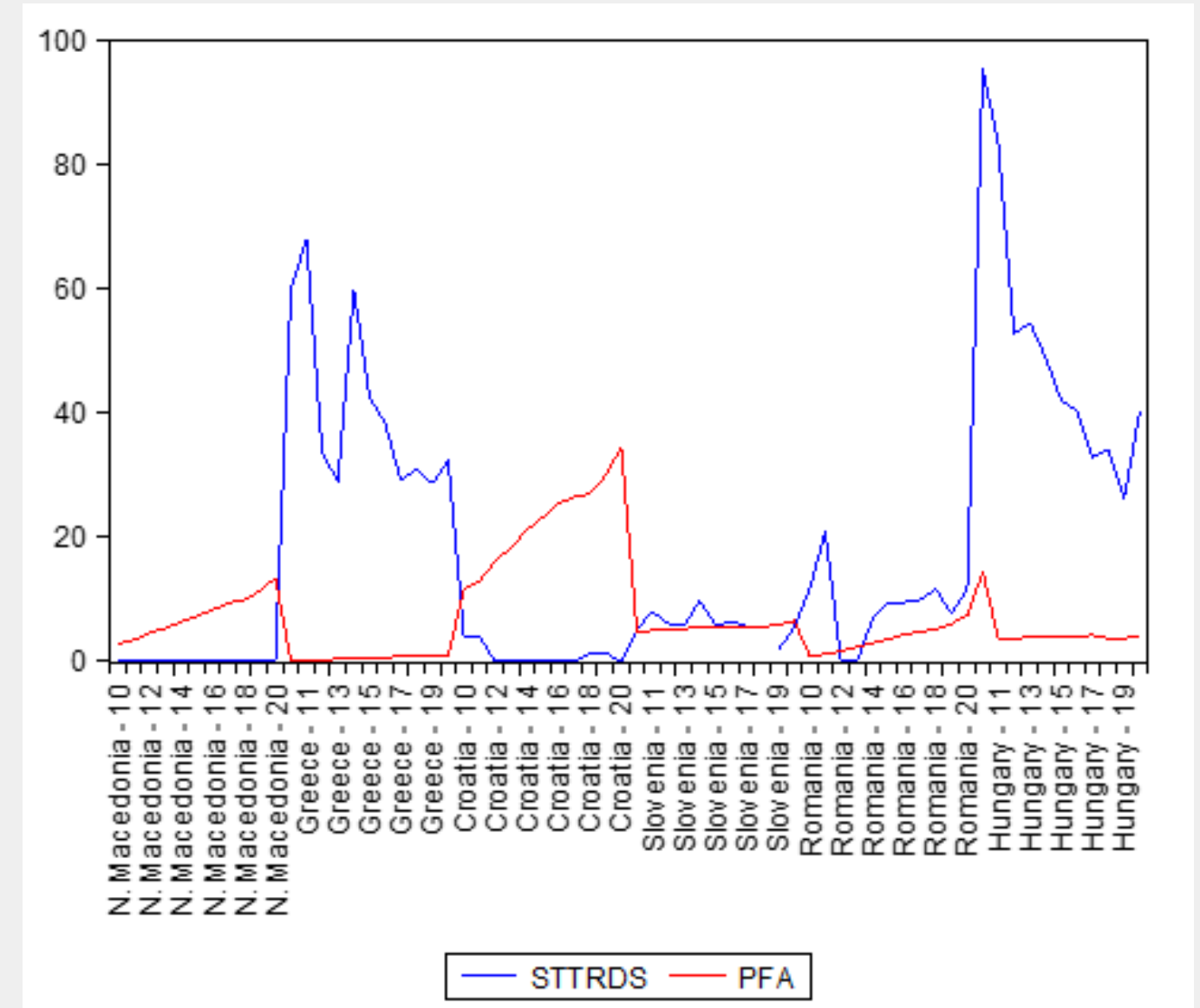
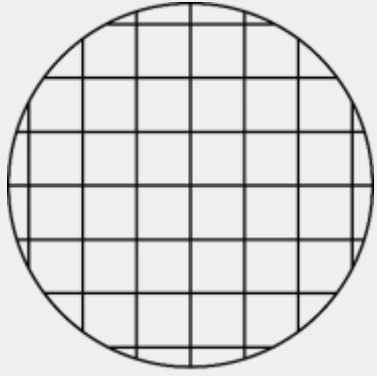# Conclusion and recommendation

1. Pension funds positively affect the stock market;

2. Need for better regulatory reforms and government policies;

3. Further measures for better mobility of pension funds for stock market development;

4. Well-developed stock market fosters economic growth (Caporalle, et al 2004);

5. Further research for bond market;
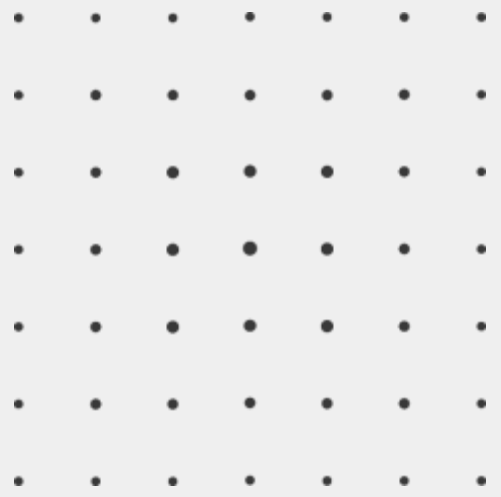
Thank you

Do you have any questions?