SPILLOVER EFFECTS OF PENSION FUNDS ON CAPITAL MARKETS. THE EU-15 COUNTRIES CASE

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Abstract
The paper aims at providing new empirical evidence for the connection between pension reform and domestic stock market development, in the case of the old member states of European Union. We seek to measure the impact of private pension funds' assets on the capital market development, using a panel data regression and after controlling for other explanatory variables. As predicted in the literature, the results show a positive connection.

Key-words: *pension, reform, stock market, EU-15, development*

JEL classification: *G23, G20, G10*

1. Introduction

Demographic dynamics has lead most of the European Union countries to carry out structural reforms of their pension systems, with the aim of alleviating public budget and creating sustainable pension schemes in the long run. Beside these reasons, another strong motivation for shifting towards a funded pension system is the belief that the development of the activity of private pension funds might bring a boost to the development of domestic capital markets. How much truth rezide though in this belief in what concerns the European Union countries?

The paper is structured as follows: Section 2 briefly underlines the main reasons that might connect pension funds with the capital market development, section 3 provides a review of the main results obtained in the economic empirical literature that has approached this subject, section 4 provides the methodological framework, section 5 concludes and offers some perspectives of future research.

2. Channels through which pension reform might trigger capital market development

In the economic literature existing until now, the very important functions of institutional investors are mentioned; these are attracting and transferring financial resources, risk controlling and encouraging the financial innovation (Blommestein [3] shows that a "strong community of institutional investors seems to be a precondition for the development of liquid securities markets with sophisticated financial vehicles"). These functions lead further to a development of the capital market by increasing liquidity and stock market capitalization existing on the market, reducing the price volatility, leading to a more efficient assessment of assets, integrating the capital market at international level, diversifying the financial instruments existing on the market and increasing the general financial stability ([3]; [11]; [29]). Other effects of developing the institutional investors' activity, found by different economists along the time, was diminishing the trading and issuing costs on the capital markets on which they act ([1]; [5]; [14]; [15]; [18]; [29]).

Within the institutional investors, pension funds are considered to have an important place due to their significant impact on the domestic capital market proven by the experience of other countries that finished well the reform of social security system. According to the opinion of some authors ([7]), the pension funds, next to the insurance companies, hold an important role in the development of domestic capital market in comparison with the other categories of institutional investors (investment funds and banks). That is because they hold liabilities payable on a long term that assumes that they can finance the economy on a longer run. Like De Ryck ([13]) is pointing out, "pension funds are excellent transformers of savings into long term investments. The majority of their aggregate assets are currently invested for the longer term. No other investor category, institutional or private, matches these figures in volume and duration". Some authors refer to their positive impact on the capital markets, both for the economies with

developed financial systems, as well as for those less developed, the influence being somewhat diminished for the latter ([12]). Other emphasize the deepening of domestic bond and equity markets following the trading developed by the pension funds, as well as the increase of liquidity of these markets ([6]; [11]; [29]). Walker and Lefort ([31]), as well as Impavido and Musalem ([19]), outline the role of pension funds in providing incentives for increased specialization in asset management by the pension funds managers, leading also to increased corporate governance required by the market.

Therefore, there seem to be in the literature enough processes as well as concurrent condition described, which seem to justify the positive connection between pension reform and the domestic stock market development. Based on the previous literature, figure no. 1 is presenting briefly the mechanism of influence which makes this linkage possible.
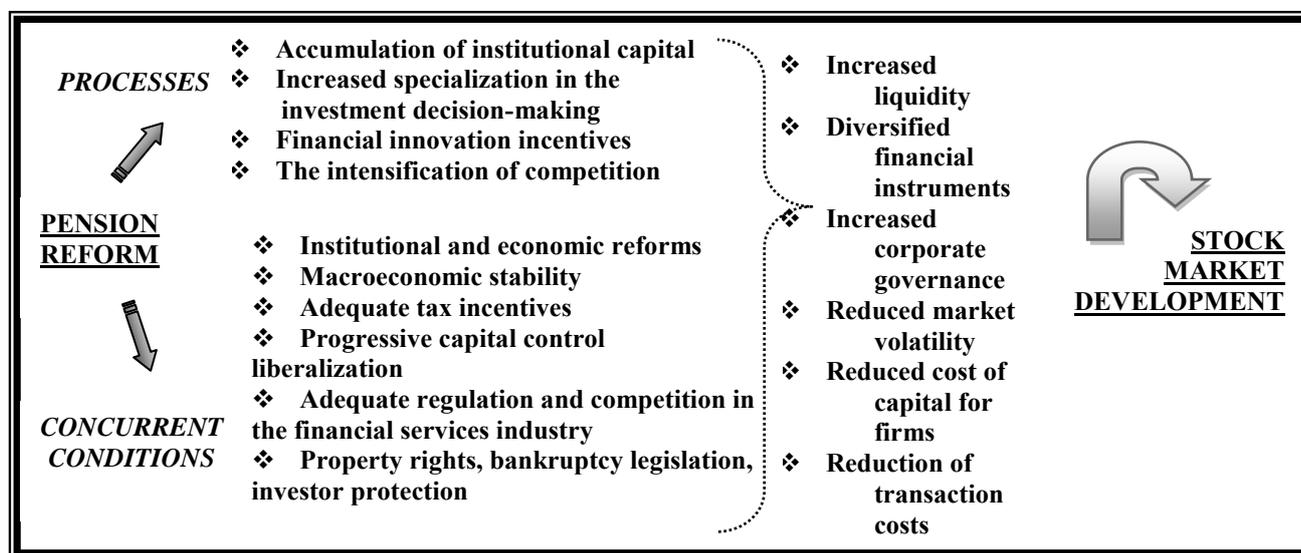

Figure no. 1. **Pension reform and stock market development. Channels of influence**
Source: realized by author

3. Empirical literature review

Throughout the time, many authors have tried to bring empirical evidence in order to prove the existence of a connection between pension funds and the stock market development, using different samples of countries. We have reviewed the majority of these studies, in a chronological order, in what concerns the used samples and used methodology (Table no. 1).

Table no.1. **Review of the main empirical papers**

Author/s	Sample	Methodology
Catalan et al. (2000)	14 OECD countries plus 5 developing countries (Chile, Malaysia, Singapore, South Africa, Thailand)	Granger causality test
Impavido and Musalem (2000)	26 countries, from which 5 developing ones	Ordinary Least Squares (OLS), Error Component (EC), Error Component Two Stage Least Squares (EC2SLS)
Walker and Lefort (2002)	Chile, Argentina, Peru, 33 emerging economies	Generalized Least Squares (GLS)
Impavido et al. (2003)	32 developed and developing countries	Dynamic panel data models (GMM)
Müslümov and Aras (2005)	23 OECD countries	Granger causality test
Raddatz and Schmuckler (2008)	Chile	Lakonishok et al. (1992) herding statistic
Hryckiewicz (2009)	8 CEE countries	GMM
Meng and Pfau (2010)	32 developed and emerging countries	GMM Least square Dummy variables (LSDVC) estimator
Niggemann and Rocholl (2010)	30 OECD member states plus 42	GLS panel regression

	non-member states (developed and emerging economies)	
Liang and Bing (2010)	UK	Granger causality
Kim (2010)	21 OECD countries	GMM

Source: realized by author

We can state that the majority of the empirical papers that guided their attention towards quantifying, with the help of panel data, the existing connection between institutional investors and capital market development were realized after 2000. The majority of the studies find a less or more intense, but positive connection between private pension funds and capital market development.

Before proceeding to our empirical analysis, if we are to look at the static connection between EU-15 pension funds and capital market development (Figure no. 2), we can easily notice the importance of their pension, as well as their domestic stock markets (well beyond the one registered in the EU-12 countries), which could intuitively connect the pension reform with the stock market development.
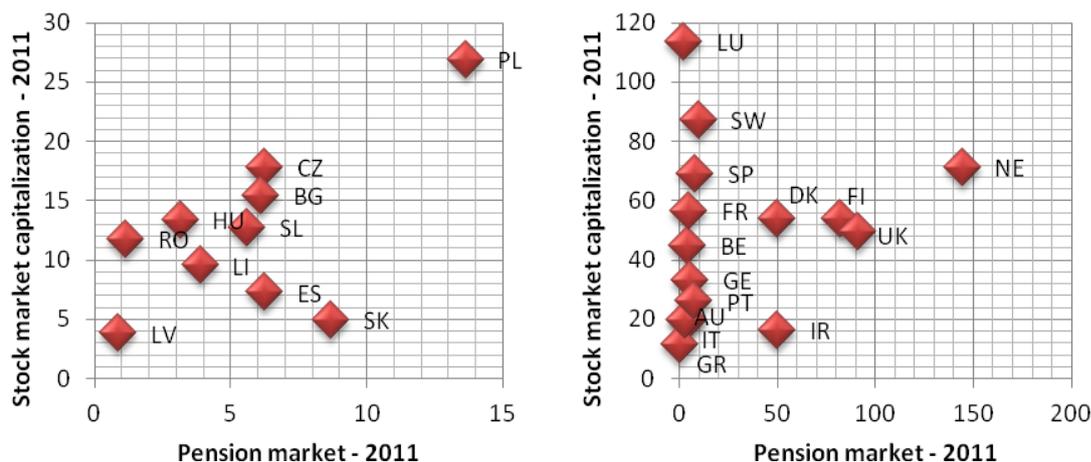

Figure no.2. **Size of the pension market relative to the stock market capitalization in the European Union countries (% of GDP)**
Source: realized by authors with data provided by World Bank (WDI) and national authorities
Note: for Denmark, Greece, Italy and Sweden the size of the pension market is reported to 2010

4. Methodological framework

We seek to measure the impact of pension fund financial assets on capital market development, investigating the case of some European Union stock markets. The empirical sample comprises the 15 old member states of European Union (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden and UK). We run a separate analysis for this group, considering the common economic features they might share and the stage of pension reform they have currently achieved. The source of data is described in Table no. 2. The period of analysis was 1994-2011.

Table no. 2. **Datasource of used variables**

Market capitalization of listed companies (% GDP)	*World Bank, World Development Indicators*
Inflation rate	*World Bank, World Development Indicators*
Long term interest rate	*European Central Bank, Eurostat, Datastream*
Real GDP per capita	*World Bank, World Development Indicators*
Economic freedom	*Heritage, Country Overall Score*
Old age dependency ratio	*Eurostat*
Pension funds' assets	*OECD, Institutional Investors Statistic Yearbook and OECD. Stat*

Source: realized by author

In order to quantify the spillover effects of private pension funds on the European Union capital markets, we assumed poolability and used a panel data structure, having in consideration a multiple linear regression (1.1). To proxy *stock market development* (as dependent variable), we used stock market capitalization over GDP (MK). To proxy

pension funds' development, we use their financial assets over GDP (PFA). In order to control for other explanatory variables that might have an influence on the development of domestic capital markets, we have focused on the following other independent variables:

- *The lagged dependent variable* - captures the effect of path dependence in the development of stock markets;
- *Inflation rate* – Impavido et al. [20] expect a positive sign when the demand of stocks increases as result to inflation expectations; Boyd, Levine, and Smith [4] state that if the inflation exceeds a critical level, the expected sign would be negative, as a result of a deteriorating financial system performance;
- *Long term interest rate* – used in the literature as a measure of controlling for the influence of changes of yields offered by bonds, as alternative financial instruments for stocks;
- *GDP per capita* – accounts for the influence of the real sector productivity on stock market development;
- *Economic freedom* – accounts for the influence of the country economic freedom on the development of the domestic stock markets; some of the measured aspects of this index are concerned with the economy's openness to global investment; we chose the overall economic freedom index, which is computed in function of four main categories (rule of law, limited government, regulatory efficiency, open markets –trade freedom, investment freedom, financial freedom). Each of these freedoms within these four broad categories is individually scored on a scale of 0 to 100. The overall score is a simple average of its scores on the 10 individual freedoms that form the 4 categories. Some authors only consider trade freedom when controlling for the development of the domestic stock markets ([26]), others consider the investment freedom or capital openness, as well as some law and order index ([16]);
- *Old age dependency ratio* – controls the effect of population aging on the stock market development; demographic dynamics is often connected in the literature with the saving and the investement pattern; when considering people like having similar rational economic behavior, preparing for retirement by accumulating financial and real assets, especially at the middle age, when they have the capacity of investing in such assets, being at their peak earning years. therefore, it is expected that a decrease in the so called „savers" group (the 40-64 years group), respectively an increase in the dissavers group, generated by the process of aging, should lead to negative effects on the domestic financial market, through the channel of lower marginal demand for financial assets.

The structural form of the regression can be seen below:

$$MK_{i,t} = \alpha MK_{i,t-1} + \beta \pi_{i,t} + \gamma_1 i_{i,t} + \gamma_2 g_{i,t} + \gamma_3 EF_{i,t} + \gamma_4 OAR_{i,t} + \gamma_5 PFA_{i,t} + \varepsilon_{i,t}$$

(1.1)

First of all, we proceeded on checking the stationarity of the variables. We performed an Augmented Dickey-Fuller (ADF) test and Dickey- Fuller for nonstationarity of the series and we could not reject the null hypothesis of a unit root. Consequently, we have approached to first-differencing the series, the results confirming the stationarity of the series.

With the new series, we have performed several estimation procedures. First of all, we have applied an OLS estimation (column 1, table no. 3). Since the variable of interest of us, pension fund assets was poorly estimated from a statistical point of view, we have proceed of more sophisticated empirical models. We chose a priori to rule out the random effects model, give the small sample. The next step was to assume that Cov (Xit, αi) ≠ 0 and Cov (Xit, λt) ≠ 0 and ran a fixed effects estimation with both cross-section and time fixed effects. The statistical tests proved the invalidity of using both cross-section and time fixed effects.

An F-test of the validity of fixed effects was employed. Compared to a regression with a common constant, we can reject the null hypothesis of the F-test that all country fixed effects are zero. The null hypothesis that all time fixed effects are zero cannot be rejected. Therefore, a one-way (cross-section) fixed effects model is appropriate. To address the heteroskedasticity problem, we allowed for a different residual variance for each cross-section (cross-section heteroskedasticity) and used EGLS estimation procedure, as well as White Diagonal standard errors and covariance. The estimation results, which finally gave us a feasible model, are given in column 2 of table no. 3. With the exception of OADR, all coefficients are statistically significant at 1, 5 and 10 % level.

Table no. 3. **Results of the estimated models**

VARIABLES	(1) OLS	(2) EGLS
	Panel Least Squares	**Estimated generalized least squares Fixed effects Cross-section weights**
		White Diagonal standard errors & covariance
Market capitalization (lagged)	-0.3468*** (0.0863)	-0.2175** (0.1016)
Inflation rate	-6.2106*** (1.6960)	-6.5362*** (1.6018)
Long term interest rate	5.1991*** (1.6318)	5.4339*** (1.4723)
Real GDP/capita	0.0104*** (0.0020)	0.0107*** (0.0029)
Economic freedom	-4.5848*** (1.4118)	-2.1413** (0.8750)
OADR	-5.9220 (5.7224)	4.6328 (4.3255)
Pension funds' assets	0.3447 (0.3397)	0.9786* (0.4883)
Observations	191	191
Number of countries	15	15
R-squared	0.2475	0.3223
Adj. R-squared	0.2229	0.2381
DW-stat	1.9435	2.0332
Jarque-Bera	196.0111	
Prob	0.0000	
F-test		3.8287
Prob		0.000

Source: realized by author
Note: Standard errors in parantheses
***p<0.01, **p<0.05, *p<0.1

5. Conclusions and further research

Overall, the results are confirming the findings from previous literature, which *positively relate the growth of pension fund industry with stock market development*. An increase in the activity of pension funds, resulting in a growth of their financial assets is positively correlated with the dynamics of market capitalization, but in a less intensive manner. The coefficient is positive and significant at 10 % level.

Inflation rate dynamics has an adverse effect on the capital market development, the coefficient being negative and significant at 1 % level. The result is consistent with Huybens and Smith [17] and Boyd et al. [4] which empirically show that higher levels of inflation are associated with smaller, less active and less efficient stock markets.

The change in the interest rates offered by long-maturity debt instruments is statistically significant and positively impacts the stock market development.

Consistent with La Porta et al. [22] and Rajan and Zingales [28] who show that countries with higher incomes also tend to have deeper and better functioning capital markets, we found evidence of a positive connection between the dynamics of GDP/capita and stock market development. Although the connection seems to be very weak, the results are statistically significant at 1 % level.

We find very interesting the coefficient sign obtained for economic freedom as determinant variable for stock market development. Since we have considered an aggregate index of economic freedom (rule of law, limited government, regulatory efficiency and open markets –trade freedom, investment freedom, financial freedom), it is hard to say which of them generated this negative sign. However, a possible explanation could indicate that the openness of the capital markets may negatively affect the activity of the capital markets due to the outflow of domestic investment abroad. This finding is consistent with Claessens et al. [9], who find that financial liberalization and openness of the capital markets might also lead to migration of capital trading activity to international stock exchanges and consequently to a reduction in the activity of the domestic capital markets.

Further research should involve more control variables that were identified as determinant factors for capital market development in this paper as well, but were not introduced as such in the model. The empirical model used in the paper has a pretty low goodness-of-fit (R square is only 0.3223 and Adjusted R square is 0.2381). This means that there are more potential omitted variables (other determinants of households saving rate) that explain the market capitalization and they should be taken into consideration. As well, a comparison between EU-12 and EU-15 countries would be interesting, from the point of view of the architecture of the pension system and the level of development of domestic capital markets.

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