



INDIVIDUAL PENSION FUNDS AND CAPITAL MARKET DEVELOPMENT IN TURKEY

YILMAZ BAYAR*

Abstract: *Beginning with the 1980s, when the sustainability of the public pension systems became endangered, many countries have developed their individual pension plans and/or occupational pension plans in order to supersede or support their public pension systems. This study examines the impact of individual pension funds on the development of both debt securities market and stock market in Turkey during the period October 2006-May 2015, using Hatemi (2008) cointegration test and Toda and Yamamoto (1995) causality test with monthly data. We found that, in the long run, the private pension funds had positive impact on both development of debt securities market and stock market. Furthermore, causality appears to exist between the market for private pension funds, the debt securities market and the stock market.*

Keywords: *individual pension funds, stock market, debt securities market, time series analysis*

JEL Classification: C22, G10, G23

1. INTRODUCTION

The population aging, the fall in fertility rates and government revenues, due to the frequent and severe global financial crises, affected the financial sustainability of the pension systems, predominantly based on the defined benefit schemes, and forced the countries to reform their pension systems. In this context, many countries have increased the retirement age, made changes in the number of years used in benefit calculation, the valorization of past earnings and indexation of pensions in payment, linked pensions to higher life expectancy and changed the structure by transitioning from defined benefit pension plans to the defined contribution pension plans, supported by private pension plans present during the

* Yilmaz Bayar, Faculty of Economics and Administrative Sciences, Department of Economics, Uşak University, yilmaz.bayar@usak.edu.tr

1980s period (i.e. individual pension plans and occupational pension plans ; Whiteford and Whitehouse, (2006)).

Turkey belatedly began to make reforms in the pension system contrary to the pension reforms in the world. The sytem was dominated by the public pension system based on a pay-as-you-go schemes and, until the 2000s, the share of occupational pensions was very small. At the beginning of the century, the retirement age was gradually increased and a private pension system was established.

In this context, the legal framework of individual pension system, which is the third pillar of the Turkish Pension System, was established in October 2001 and it became operational as of October 2003. The main objectives is to reduce the share of public pension system, increase the welfare of the retired and contribute to both the economic development and capital market development (Pension Monitoring Center, (2015a)). As a consequence, according to the Pension Sustainability Index (PSI), during 2011-2014, Turkey shifted upwards by than five places (Allianz, 2014).

Since its implementation, the Turkish Individual Pension System has made significant progress and more than 5 million persons participated, with 19 companies operating in the pension business sector, the value of individual pension funds, as of 31st December 2014, surpassing 34 billion Turkish lira; TL (Pension Monitoring Center (2015b)). During the 2009-2014 period, the Turkish pension funds have generally been invested in the debt securities, and only 10-14 % of the funds being invested in the stocks (Table 1).

Table 1 Consolidated asset allocation of the pension mutual funds in Turkey (2009-2014)

Year	Government bonds (in TL) ratio (%)	Reverse repo ratio (%)	Stock ratio (%)
2009	69-75	12-17	7-11
2010	58-72	9-18	8-14
2011	57-72	6-18	8-17
2012	58-62	7-13	11-16
2013	57-60	5-9	14-18
2014	50-57	6-10	13-16

Note: The ratios show the yearly asset level

Source: Pension Monitoring Center, 2015c

Worldwide, the share of pension funds in the pension system has increased and, in 2013, the value reached USD 24.7 trillion, which represented 26.67 % of the USD 92.6 trillion provided by institutional investors (OECD, 2014). Thus, pension funds became an important institutional investor in the world.

The expansions in private pensions have led researchers to investigate the impact of private pensions on capital market development as of 2000s, but the studies have generally focused on the interaction between private pensions and stock market development. Therefore, the present study contributes by considering both stock market and debt securities market, it being among the first to investigate the relationship between private pensions and capital market in the case of Turkey.

Therefore, the impact of the growing pension funds on stock market and debt securities market in Turkey during the period October 2006-May 2015 is investigated using cointegration and causality analyses. The remainder of the study is organized as follows: Section 2 provides the literature review ; Section 3 presents the data and econometric methodology; Section 4 presents the findings of econometric application and Section 5 concludes.

2. LITERATURE REVIEW

As of 1980s, when the sustainability of the public pension systems was considerably endangered, many countries began supporting or superseding the public pension systems by funded pension schemes (i.e. private pension plans and occupational pension plans) . Increases in private pensions have encouraged the researchers to determine the economic impacts of growing private pensions. In this regard, studies have generally focused on the impact of the growing private pension funds on the economic growth and the development of capital markets (Zandberg and Spierdijk (2013), Bijlsma et al. (2014), Enache et al. (2015)).

Pension funds as institutional investors are long-term sophisticated investors, with better knowledge, compared to the individual investors. In this regard, it is expected that the pension funds contribute to the development of capital markets by capital accumulation, fund raising, increasing liquidity, reducing the volatility and increasing financial innovation in the capital markets (Enache et al., 2015).

On the other hand, extensive studies have been conducted to reveal the impact of private pension on capital markets. The empirical findings have generally benefited from panel regression and causality analysis to investigate the

relationship between expanding private pensions and capital market development, employing total financial assets of pension funds for pension funds and stock market capitalization for stock market development and total value of debt securities outstanding for debt market development. Results showed that private pension funds, as institutional investor, had positive impact on the development of capital markets or Granger cause of the development of capital market (Davis (1998), Catalán et al. (2000), Walker and Lefort (2002), Aras and Müslümov (2005), Niggemann and Rocholl (2010), Hu (2012), Thomas et al. (2014), Enache et al. (2015)), while relatively few studies have found that private pension funds had no significant impact on the capital markets (Raddatz and Schmuckler (2008)).

In one of the early works, Davis (1998) investigated the impact of pension funds on financial markets development in G7 countries (i.e. Canada, France, Germany, Italy, Japan, UK and U.S.) using panel regression and found that increases in the share of institutional investors, including pension funds proxied by the share of institutional investors in total financial assets, had positive impact on the size of financial sector proxied by total financial assets/GDP and the share of equity in total financial assets.

On the other hand, Catalan et al. (2000) examined the causality between contractual savings and stock market development proxied by stock market capitalization in 14 OECD countries and 5 developing countries (Chile, Malaysia, Singapore, South Africa, and Thailand), employing Granger causality test, and a unidirectional causality from contractual savings to the stock market capitalization was revealed in the UK, Belgium, Spain, Netherlands, Canada, Finland and Germany.

Impavido and Musalem (2000) also investigated the relationship between contractual savings and stock market development in 21 OECD countries and 5 developing countries during the 1982-1996 period, using panel regression, and it was found that contractual savings, including pension funds, had positive impact on stock market development.

Walker and Lefort (2002) examined the interaction between pension funds and development of capital markets in Argentina, Chile and Peru using time series analysis and found that pension funds had positive impact on stock market development only in Peru. Furthermore, they investigated the same relationship in 33 emerging market economies using panel regression and found that pension funds decreased the market volatility.

On the other hand, Impavido et al. (2003) conducted an empirical analysis on the impact of pension funds on capital market development proxied by stock market capitalization and total value of bonds outstanding in selected 33 countries including OECD and emerging economies such as Argentina, Chile, Hungary, Malaysia, Poland, South Africa and Turkey by using dynamic panel regression and found that pension funds had positive impact on the development of both stock market and debt market. Aras and Müslümov (2005) also conducted the Sims (1982) causality analysis between institutional investors including pension funds proxied by total financial assets of pension funds as % of GDP and stock market development proxied by stock market capitalization in 23 OECD countries during 1982-2000 period and found that pension funds had positive impact on stock market development.

Raddatz and Schmuckler (2008), using descriptive statistics, regression and Lakonishok et al. (1992) herding statistic, examined the relationship between pension funds and capital market development in Chile during the 1995-2005 period and revealed that there was no significant relationship between pension funds and the development of capital markets.

On the other hand, using dynamic panel regression, Hryckiewicz (2009) analyzed the relationship among pension funds proxied by financial assets of the funds and stock market development proxied by stock market capitalization and debt market development proxied by total value of bonds outstanding in 8 Central and Eastern European countries during the 1995-2006 period and found that pension funds had positive impact on the development of stock market and debt market.

Meng and Pfau (2010) investigated the impact of pension funds proxied by financial assets of the funds on both stock market development proxied by stock market capitalization and debt market development proxied by private bond market capitalization in 32 developed and emerging market countries during the 2003-2007 period using dynamic panel regression and found that pension funds had positive impact on the development of stock market and debt securities market.

Niggemann and Rocholl (2010), employing panel regression, investigated the impact of pension reforms on development of capital markets in 57 countries during the 1976-2007 period and have reached similar results with Meng and Pfau (2010).

Using Johansen cointegration and Granger causality tests, Liang and Bing (2010) investigated the interaction between pension funds and financial

development in the UK during the 1970-2008 period and revealed that pension funds had positive impact on the development of financial markets.

Kim (2010) examined the impact of pension funds proxied by value of financial assets on capital market development proxied by stock market capitalization and domestic credit in 21 OECD countries during the 1991-2003 period using dynamic panel regression and found that pension funds had positive impact on stock market development.

Hu (2012) examined the impact of pension funds proxied by financial assets of the funds on development of stock market proxied by stock market capitalization and bond market proxied by bond market capitalization in 10 Asian and Pacific economies during the 2001-2010 period using panel regression and found that pension funds had positive impact on development of both stock market and bond market.

Raisa (2012) conducted an empirical study on the relationship between pension funds and stock market development proxied by stock market capitalization in EU-15 countries during 1994-2011 period using panel regression and revealed a positive relationship between pension funds and stock market development.

Sun and Hu (2014) investigated the relationship between pension funds and capital market development in 55 countries during 2001-2008 period using panel regression and reached similar findings with Hu (2012) and Raisa (2012).

Thomas et al. (2014), employing panel regression, examined the relationship between investments of pension funds in terms of stocks and stock market volatility in 34 OECD countries during the 2000-2010 period and revealed a negative relationship between financial assets of the funds in terms of stock and stock market volatility.

Furthermore, Enache et al. (2015) investigated the impact of pension funds proxied by financial assets of the funds on stock market development proxied by stock market capitalization in 10 Central and Eastern European countries during 2001-2010 period using panel regression and found that pension funds had positive impact on stock market development.

3. DATA AND METHODOLOGY

Using Hatemi (2008) cointegration test and Toda and Yamamoto (1995) causality test, the impact of individual pension funds on the development of stock

market and debt securities market in Turkey during the period October 2006-May 2015 was investigated.

3.1. Data

The monthly data (for the period October 2006-May 2015) of the total amount of individual pension funds was retrieved from the Pension Monitoring Center (2015b), while the monthly data of stock market capitalization and traded value of debt securities market was collected using the Istanbul Stock Exchange (i.e. Borsa Istanbul; (2015 a and b)). The data availability determined the period considered. The variables used as well as their symbols are presented in Table 2. The logarithmic forms of all the variables were used, together with the RATS 8.0, Gauss 10.0 and Eviews 9.0 software packages.

Table 2 *Description of the used variables*

BIST	Value of Borsa Istanbul National Stock Market Capitalization
DSM	Debt Securities Market Traded Value (outright purchases and sales market)
IPF	Private Pension Funds of All the Participants

Note: All values later on used are expressed in Turkish lira

3.2. Methodology

The first step was to test the stationarity of the time series using Lumsdaine and Pappell (1997) unit root test, followed by the analysis of the long-run relationship between the variables using Hatemi's (2008) cointegration test, estimating the cointegrating coefficients by Fully Modified Ordinary Least Squares (FMOLS). Finally, the causality between the variables was examined using Toda and Yamamoto's (1995) causality test.

3.2.1. *Lumsdaine and Pappell's (1997) Unit Root Test*

The traditional unit root tests (i.e. Augmented Dickey-Fuller (ADF) (1981) and Phillips-Perron (1988) unit root tests) disregard the structural breaks while testing the stationarity of the time series, thus yielding faulty results. Therefore, improving the Zivot and Andrews' (1992) unit root test, Lumsdaine and Papell (1997) developed a unit root test which enables two structural breaks in the series .

In the context of the Lumsdaine and Papell (1997) unit root test, there are two models, namely Model AA and Model CC, The first allows two structural

breaks only in the intercept, while the latter allows two structural breaks in both intercept and trend. expressed as follows:

$$\Delta y_t = \mu + \beta t + \theta DU1_t + \gamma DT1_t + \omega DU2_t + \psi DT2_t + \alpha y_{t-1} + \sum_{i=1}^k c_i \Delta y_{t-i} + \varepsilon_t \quad (1)$$

where:

- if $t > TB1$, $DU1_t = 1$, otherwise 0, and if $t > TB2$, $DU2_t = 1$, otherwise 0.
- If $t > TB1$, $DT1_t = t - TB1$ and otherwise 0, while if $t > TB2$, $DT2_t = t - TB2$ and otherwise 0.
- The dummy variables ($DU1_t$ and $DU2_t$) represent the structural breaks in the intercept at $TB1$ and $TB2$, while the remaining dummy variables ($DT1_t$ and $DT2_t$) represent the structural breaks in the trend at $TB1$ and $TB2$.

3.2.2. Hatemi (2008) Cointegration Test

In order to allow two structural breaks both in constant and trend, Hatemi (2008) developed Gregory and Hansen's (1996) cointegration test and the model can be expressed as follows:

$$y_t = \alpha_0 + \sum_{i=1}^2 (\alpha_i D_{it} + \beta'_i D_{it} x_t) + \beta'_0 x_t + u_t \quad (2)$$

where:

- α_0 - the constant term before the structural breaks;
- α_1 and α_2 - the change in the constant term due to the first and second structural breaks.
- β_0 - the trend term before the structural breaks;
- β_1 and β_2 - the change in the trend term due to the first and second structural breaks.
- The dummy variables (D_{1t} and D_{2t}) reflect the effects of structural breaks. $D_{1t} = 1$ if $t > n\tau_1$, otherwise 0. $D_{2t} = 1$ if $t > n\tau_2$, otherwise 0.
- τ_1 and τ_2 - unknown parameters showing the timing of regime change point (Yılancı and Öztürk (2011))

The test of null hypothesis (i.e. there is no cointegration among the variables) is conducted using ADF^* , Z_α and Z_t test statistics. ADF^* is calculated by applying ADF unit root test statistics to the residuals obtained from the (2) numbered equation. Z_α is calculated by using $Z_\alpha = m(\hat{\rho}^* - 1)$, where $\hat{\rho}^*$ is the

estimator of first-order autocorrelation coefficient which its bias is adjusted. Z_t is calculated by using $Z_t = \frac{(\hat{\rho}^* - 1)}{[\hat{\gamma}(0) + 2 \sum_{j=1}^B w(j/B) \hat{\gamma}(j)] / \sum_{t=1}^{n-1} \hat{u}_t^2}$ (Hatemi (2008)).

3.2.3. FMOLS

The FMOLS test was developed by Phillips and Hansen (1990) and it can explained by the following linear regression:

$$LDSM = \alpha + \beta_1 LIPF_t + \varepsilon_t \quad (3)$$

where:

- $LDSM$ - the dependent variable;
- $LIPF_t$ - the independent variable. Both variables are I(2).

$$\Delta LIPF_t = \mu + w_t,$$

where:

- μ -the ($k \times 1$) average parameter vector of the independent variable;
- w_t - the ($k \times 1$) vector of the stationary vectors. It is assumed that $\xi_t = (\varepsilon_t, w_t)$ is strongly stationary and has a covariance matrix with limited positiveness (Chi and Baek, (2011)).

3.2.4. Toda and Yamamoto (1995) Causality Test

Toda and Yamamoto (1995) improved the Granger (1969) causality test and this developed test can analyze the causality among the variables without pretesting cointegration. The optimal lag length p is determined by establishing the VAR model, followed by the addition of the highest integration degree (d_{max}) among the variables to the p . The Ordinary Least Squares model is estimated with the variables at the level for the $p + d_{max}$ lag. Finally, the constraints are imposed on the variables respectively and the significance of these constraints are tested using standard Wald test for p lag (Büyükkakın et al., (2009)).

4. EMPIRICAL ANALYSIS

4.1. Lumsdaine and Papell's (1997) Unit Root Test

Using the Lumsdaine and Papell's (1997) unit root test by the stationarity of the variables was tested by selecting the model CC, which enables the structural break both in constant and trend (. The results (Table 3) indicate that all the variables became stationary after first differencing.

Table 3 *Results of the Lumsdaine and Papell's (1997) Unit Root Test*

Variables	TB1	TB2	Test Statistic
LDSM	January 2010	August 2013	-6.5766*
D(LDSM)	January 2010	April 2011	-6.8179**
LIPF	February 2010	October 2012	-5.4247
D(LIPF)	February 2010	February 2014	-10.2647***
LBIST	December 2007	March 2009	-5.2229
D(LBIST)	February 2009	December 2011	-11.6301***

Note: Critical values at 1 %, 5 % and 10 %, respectively, are -7.19, -6.75 and -6.48 (Ben-David et al., (2003))

TB1 and TB2 represent the first and second structural breaks in the series

*, **, *** show the statistical significance at the 10 %, 5 % and 1 % level

4.2. Hatemi's (2008) Cointegration Test

This approach was used in order to determine whether there was long run relationship among the variables. In this regard, we established two models. LDSM (debt securities market) is the dependent variable in Model 1, while LBIST (stock market) is the dependent variable in Model 2. The model which allows breaks both in the constant and the trend was selected. The results (Table 4) indicate that there was long run relationship both between LDSM and LIPF and between LBIST and LIPF.

Table 4 *Results of Hatemi's (2008) Cointegration Test*

Dependent Variable		TB1	TB2	Test Statistic
LDSM	ADF*	December 2009	March 2012	-10.695030***
	Z_t	December 2009	April 2011	-11.233***
	Z_a	December 2009	April 2011	-114.482***
LBIST	ADF*	October 2008	April 2009	-5.9044977*
	Z_t	January 2008	April 2011	-5.449
	Z_a	January 2008	April 2011	-46.524

Note: *, **, *** denote that the statistical significance at the 10 %, 5 % and 1 % level.

TB1 and TB2 represents the first and second structural breaks.

4.3. Fully Modified Least Squares (FMOLS)

We estimated the long run cointegrating coefficients by FMOLS method developed by Phillips and Hansen (1990) because we found that there was cointegration relationship in the two models of Hatemis (2008) cointegration test. The results (Table 5-6) indicate that private pension funds had a positive impact on

the development of stock market and the debt securities market. In addition, when compared to the stock market, the impact of private pension funds on the debt securities market was relatively higher.

Table 5 FMOLS Results for Model 1

Dependent variable		LDSM		
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LIPF	0.487803	0.151873	3.211918	0.0018
C	28.77898	3.521471	8.172432	0.0000

Table 6 FMOLS Results for Model 2

Dependent variable: LBIST				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LIPF	0.383609	0.048175	7.962885	0.0000
C	17.76160	1.117025	15.90081	0.0000

The findings are consistent with the theoretical expectations and findings of previous studies investigating the same relationship for different country groups (Impavido and Musalem (2000), Impavido et al. (2003), Hryckiewicz (2009), Meng and Pfau (2010), Niggemann and Rocholl (2010), Kim (2010), Hu (2012), Sun and Hu (2014), Enache et al. (2015)). However, the impact of private pension funds on the development of debt securities market was relatively higher when compared to the stock market, because the share of debt securities in pension funds has been much more than the share of stocks in pension funds.

4.4. Toda and Yamamoto's (1995) Causality Test

We analyzed the causality among the individual pension funds, stock markets and debt securities market using Toda and Yamamoto's (1995) causality test. The results (Table 7) indicate that both IPF and BIST are Granger cause of DSM, while IPF is Granger cause of BIST.

Table 7 Results of Toda and Yamamoto's (1995) causality test

Null hypothesis	Chi-sq	Prob.
IPF does not Granger cause of DSM	4.724272	0.0297
BIST does not Granger cause of DSM	3.264052	0.0708
DSM does not Granger cause of IPF	0.709511	0.3996
BIST does not Granger cause of IPF	0.855907	0.3549
DSM does not Granger cause of BIST	0.010108	0.9199
IPF does not Granger cause of BIST	3.309739	0.0689

5. CONCLUSION

Recently, in Turkey, the market of individual pension funds has grown stably with the contribution of the government promotions. The present study examined the impact of individual pension funds on the development of both debt securities market and stock market in Turkey during the period October 2006-May 2015 using Hatemi's (2008) cointegration test and Toda and Yamamoto's (1995) causality test.

It was found that there was a long-run relationship between the variables and the individual pension funds had positive impact on the development of both stock market and debt securities market in the long run, but the impact of individual pension funds on the debt securities market was found to be relatively higher, because the individual pension funds mainly invest their funds in debt securities.

The above findings are consistent with the theoretical considerations and the general trend (Impavido and Musalem (2000), Impavido et al. (2003), Aras and Müslümov (2005), Hu (2012) and Enache et al. (2015)). On the other hand, the causality test indicated there was unidirectional causality from both stock market development and individual pension funds to the debt securities market, while there was unidirectional causality from individual pension funds to the stock market development. Thus, individual pension funds have contributed to the development of Turkish capital markets.

Following the 2001 Turkish economic crisis, many structural reforms especially in the banking sector and capital markets were implemented. The Turkish economy has experienced considerable rates of economic growth and foreign capital inflows after the structural changes in regulatory, legal and institutional framework. These economic and institutional improvements also restored the lost confidence of the Turkish public in capital markets. The governmental subsidies for the individual pension system, together with the increasing income and confidence in financial markets became useful for the development of individual pension system. The development of individual pension system contributed to the sustainability of the public pension system and capital market development in the light of our findings. On the other hand, the empirical studies showed that capital market development had positive impact on the economic growth (Barna and Mura (2010)). In this regard, it will also contribute to

the economic growth by providing long run capital through capital market development.

Consequently, private pensions may contribute to the sustainability of pension system, the development of capital markets and, in turn, the economic growth. Therefore, considering the population ageing phenomenon, the decline in government revenue and the spillover economic effects of private pension funds, countries should implement policies which would increase the share of private pensions.

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