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Abstract

This paper provides an investigation of the impacts of pension funds on capital market development, both for stock markets and bond markets. For the overall sample of countries, we find that pension fund financial assets have positive impacts on stock market depth and liquidity as well as private bond market depth. However, when we split the countries into two groups according to their level of financial development, the impacts are only significant for countries with ‘high’ financial development. Pension funds do not impact capital market development in the countries with a ‘low’ level of financial development. These findings are based on a biased-corrected Least Square Dummy Variables (LSDVC) estimator. The results suggest that countries with 'low' financial development should reconsider the management approach and investment strategies for their pension funds.

Keywords: Pension funds, capital market development, bias-correct least square dummy variable estimator, generalized method of moments estimator, regulation, asset allocation

JEL Classification Codes: C23, G11, H55, G23

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The Role of Pension Funds in Capital Market Development

1. Introduction

Demographic change is a growing concern for both developed and developing countries. Increasing longevity and reduced fertility threaten the sustainability of traditional pay-as-you-go pension systems. The pension contributions from the working population will not be sufficient to support the elderly. In response, countries are increasingly shifting their pension systems toward partial or full funding. In addition to the main purpose of coping with demographic pressures and unsustainable fiscal positions, other motivations for countries to reform their pension systems often include the hope that funded pensions will contribute to economic development by promoting national savings and capital market development. In this study, we seek to determine the impacts of pension funds on the development of capital markets. This paper reaches further than previous studies by separating countries according to their level of financial development to account for potential heterogeneity in the results, by using new estimation techniques that have been shown to produce less bias, and by basing results on a larger panel dataset, both in terms of the number of countries and the number of time periods.

The introduction of funded pension systems allows pension funds to accumulate assets that can be invested in financial markets. Even in the case that pension savings crowd out other household savings such that the total savings in the economy do not increase, the accumulation of pension fund assets is expected to potentially promote depth and liquidity in the capital markets because of the different investment behavior between households and pension funds. With accumulating assets and the longer-term nature of their liabilities, pension funds have incentives to invest more in illiquid and long-term assets that yield higher returns, and thus provide a long-term supply of funds to the capital markets (Davis, 1995). As well, Catalan, Impavido, and Musalem (2000) argue that with their stake in illiquid pension funds, households will increase their liquidity by holding deposits in the banking sector, open-end mutual funds, and traded securities, at the expense of other illiquid assets such as real estate or non-traded financial instruments. Such behavior will also stimulate financial market development.

Pension fund activities may also induce capital and financial market development through their substituting and complementary roles with other financial institutions, specifically commercial and investment banks. As competing intermediaries for household savings and corporate financing (as noted by Impavido, Musalem, and Tressel, 2002), pension funds foster competition and may improve the efficiency of the loan and primary securities markets. This results in a lower spread between lending rates and deposit rates, and lower

costs to access capital markets. On the other hand, Davis (1995) argues that pension funds may complement banks by purchasing long-term debt securities or investing in long-term bank deposits. Other potential impacts from the growth of pension funds include an inducement toward financial innovation, improvement in financial regulations and corporate governance, modernization in the infrastructure of securities markets, and an overall improvement in financial market efficiency and transparency (Davis, 1995). Such impacts should ultimately spur higher long-term economic growth.

Some studies have sought to quantify the impacts of pension funds on capital markets, but the literature is still relatively sparse. Catalan, Impavido, and Musalem (2000) conduct Granger causality tests on 14 OECD countries and 5 developing countries, separately, to see the causal relationship between stock market development and contractual savings institutions including pension funds. They conclude that contractual savings predominantly Granger cause stock market development. To a lesser extent, the causality happens simultaneously between them, and very slightly, the causality runs the other direction. Even though they find such causal evidence, their estimation might suffer from the small number of time period observations. For example, the number of observations is only 6 for Austria, 8 for Portugal, and 9 for Australia.

Impavido and Musalem (2000) study the impact of contractual savings and non-life insurance institutions on stock markets using Ordinary Least Squares (OLS), Error Component (EC), and Error Component Two Stage Least Squares (EC2SLS) estimators on a panel of 26 countries, 5 of which are developing countries. They find a statistically significant impact of contractual savings financial assets on stock market capitalization, but not on stock value traded.

Walker and Lefort (2002) carry out a panel study using a Generalized Least Squares (GLS) estimator for 33 emerging markets and find positive links between pension reform and capital markets. They find that pension fund assets reduce dividend yields and increase price-to-book ratios, thereby implying a decrease in the cost of capital. However, they also admit that some of their estimation results may suffer severely from measurement error problems, and their conclusions are preliminary and need to be verified again when a longer period of observations becomes available.

Impavido, Musalem, and Tressel (2003) incorporate dynamic panel models to estimate the impact of contractual savings institutions on stock market and bond market development. With the use of an Arellano and Bond (1991) differenced GMM estimator on 32 developed and developing countries, they find that contractual savings financial assets have significant impacts on stock market and bond market development. Nonetheless, with a small number of

cross-section units and short time periods (six years on average in their study), the GMM estimators suffer from potentially large finite sample bias.

Identifying the impacts of pension funds on capital market development is important. The analysis requires a reliable estimation method to be convincing. In this paper, we employ the recently developed bias-corrected Least Squared Dummy Variable (LSDVC) estimator, which produces reliable estimates for dynamic panel data models with a finite number of cross-section units and time periods. This LSDVC estimator has been shown to outperform instrumental variable (IV) and GMM estimators in dynamic panel models in terms of bias and efficiency (Kiviet, 1995; Judson and Owen, 1999). In addition to developing more reliable estimates, the other main contribution is the finding that the impacts of pension funds vary by a country's level of financial development. Though we find a significant impact of pension funds on capital market development in the overall sample, this result is driven by countries with 'high' financial development. For countries with 'low' financial development, pension funds do not show a significant impact. Countries with different levels of financial development have different financial market climates that can directly impact the role and performance of pension funds. Differences include pension fund investment regulations, market efficiency, transparency, the legal framework, market activities, and macroeconomic and financial conditions. The investment behavior and asset allocation of pension funds in the two types of markets are different, suggesting that countries with 'low' financial development must do more to create conditions for their pension funds to positively impact capital market development.

2. Methodology

Though we use a different econometric estimation technique, we follow the basic methodological framework developed in Impavido *et al.* (2003). In this model, investors choose to between three assets: stocks, quasi-money (remunerated bank deposits, bills, and bonds) which bears interest, and non-interest bearing money. These three assets are substitutes for one another. Each investor determines personal demand for each type of asset, and the total demand function for each asset is the aggregated demand across individuals. We assume that each asset's supply is fixed, which is reasonable if the variation of the short-run supply is smaller than that of demand. Investors are rational and their demand functions depend on a set of factors including expected asset returns and risks, and institutional characteristics.

With the panel structure of our data, we consider the following dynamic panel regression model, which allows for endogenous persistence of the dependent variable (by

incorporating the lagged dependent variable as an independent variable), unobserved country-specific effects, and time-specific effects:

$$Y_{it} = \alpha Y_{i,t-1} + \beta' R_{i,t-1} + \chi' V_{i,t-1} + \delta' Z_{i,t-1} + f_i + d_t + u_{it} \quad (1)$$

where Y_{it} are indicators for either stock market development or bond market development, each of which will be estimated separately. $R_{i,t-1}$ is a vector of explanatory variables characterizing the real returns for the three financial assets, and $V_{i,t-1}$ is a vector characterizing their volatility or risk. $Z_{i,t-1}$ is a vector of institutional features that affect financial markets, including the level of economic development and the size of pension funds relative to GDP. f_i captures all unobserved country-specific fixed effects. d_t is a full set of year dummies to capture aggregate shocks. In this model, we use explanatory variables in lag form, which is natural if there is a causal effect from those variables to the dependent variable.

For the estimation of this dynamic panel data model, OLS will produce biased and inconsistent estimates even though the error terms are not serially correlated. While the traditional fixed effect estimator can remove the unobserved country-specific time-invariant characteristics through variable transformation, bias and inconsistency still exist due to the correlation between the transformed lagged dependent variable and the transformed error terms. Because of these problems, researchers have proposed alternative estimation methods. Anderson and Hsiao (1981) propose a first-difference transformation to eliminate individual effects, f_i, and employ $\Delta Y_{i,t-2} = Y_{i,t-2} - Y_{i,t-3}$ or $Y_{i,t-2}$ as an instrument for the transformed lagged dependent variable, $\Delta Y_{i,t-1}$, which is correlated with the transformed error terms, Δu_{it}. This instrumental variable estimation method produces consistent estimates as long as the u_{it} are not serially correlated. However, this method does not necessarily yield efficient estimates.

Arellano and Bond (1991) propose a differenced GMM procedure that provides more efficient estimates by making use of additional instruments whose validity is based on the orthogonality between the lagged values of the dependent variable and the transformed error terms. Arellano and Bover (1995) and Blundell and Bond (1998) later develop system GMM estimation, which uses the lagged difference of Y_{it} as instruments for equations in levels, in addition to the use of lagged levels of Y_{it} as instruments for equations in first differences. This improves the poor performance of the differenced GMM estimation in cases where the autoregressive parameter of Y_{it} approaches one and the sample periods are short.

However, a weakness of the IV and GMM estimators is that their properties only hold when there is a large number of cross-section units (*N*), and some bias and imprecision of the estimates may arise with a small size for *N*. This is the case for our panel as well as most macro panels. Moreover, Monte Carlo experiments by Kiviet (1995) and Judson and Owen (1999) show that IV and GMM estimators often have a larger variance than fixed effects or LSDV estimators.

As such, the LSDV estimator with bias correction (LSDVC) has been considered as an alternative approach for dynamic panel data models with exogenous regressors when the number of cross-section units is relatively small, as it has been shown to outperform alternative estimators. Nickell (1981) derives an analytic expression for the inconsistency of an LSDV estimator for $N \to \infty$. It is bounded on the order T^{-1}. However, he did not consider any terms that contribute to bias resulting from a small *N*. Kiviet (1995) uses higher order asymptotic expansion techniques, terms of order $N^{-1}T^{-1}$, to approximate the small sample bias of the LSDV estimator. With Monte Carlo experiments, he also shows that the resulting bias-corrected LSDV estimator, in many circumstances, outperforms the IV and GMM estimators in terms of bias and root mean squared error. Monte Carlo evidence from Judson and Owen (1999) also strongly support its superiority when *N* is small. Later, Kiviet (1999) derives a more accurate bias approximation with $N^{-1}T^{-2}$ order terms. Bun and Kiviet (2003), after simplifying the approximation formula in Kiviet (1999), analyze the performance of Kiviet's approximations with Monte Carlo simulations and reveal that the first-order terms of the approximation already comprise around 90 percent or more of the true bias. The terms of order $N^{-1}T^{-1}$and $N^{-1}T^{-2}$ only lead to minor improvements. These procedures to correct for bias in LSDV estimators were applicable only for balanced panels. But, more recently, Bruno (2005) accommodates unbalanced panels with an exogenous selection rule. Monte Carlo results therein also parallel those in Bun and Kiviet (2003).

With the unbalanced structure of our panels and the finite number of cross-section units and time periods, we will apply the bias-corrected LSDV estimation technique for unbalanced panels.[1] We consider it to be the most appropriate and reliable estimator, compared to the existing IV and GMM estimators. But to demonstrate the robustness of our findings, we also compare estimates from the Arellano and Bond (1991) differenced GMM estimator.[2]

[1] In practice, bias-corrected LSDV requires initial consistent estimates for the bias-correction procedure. We opt for the Arellano and Bond (1991) GMM estimator as the initial estimator.

[2] We do not use the system GMM estimator because the assumptions required for the additional moment conditions employed in system GMM are inappropriate for this study. The orthogonality assumptions between the lagged difference of the dependent variable and the fixed effects in the context of our study means that the

To pursue the other main objective of our study, which is to identify the difference in pension fund impacts for countries with different levels of financial development, we split the countries into two groups: 'high' financial development and 'low' financial development. To categorize such groups, we follow Demirguc-Kunt and Levine (1996) to construct a conglomerate index by combining the standardized measures of five financial indicators: stock market capitalization over GDP, stock value traded over GDP, stock value traded over market capitalization, liquid liabilities (M3) over GDP, and credit provided to the private sector over GDP.[3] We classify the countries into each group based on whether their index values are above or below the median index value across the countries.

3. Data, Variable Definitions, and Descriptive Statistics

We seek to measure the impact of pension fund financial assets on capital market development, investigating both stock markets and bond markets. To proxy stock market development, we use stock market capitalization over GDP (MC/GDP) and stock market value traded over GDP (VT/GDP), both of which are widely used indicators for stock market depth and liquidity, respectively. For bond markets, different from Impavido *et al.* (2003), we consider only private bond markets, rather than the combined public and private bond markets. Private bond market capitalization over GDP (PBMC/GDP) should serve as a better proxy for the development of financial markets, whereas public bond issuance largely depends on the government's fiscal position and other needs. Pension fund investment in public sector bonds may not represent a freely determined decision.

Real rates of return and risks for the three groups of financial assets are controlled for and defined as follows. The real rate of return on stocks is defined as $\left[(1+p+d)/(1+\pi)-1\right]$, where p is the rate of change in the stock price index, d is the dividend yield, and π is the inflation rate. The real rate of return on quasi-money is defined as $\left[(1+i)/(1+\pi)-1\right]$, where i is the nominal interest rate on deposits. The real return on money is proxied by the negative inflation rate. The risk measures for the real returns are calculated from monthly data as the ratio of within-year standard deviation of returns to the mean of the within-year real returns. The size of pension funds is measured in terms of pension fund financial assets as a proportion of GDP (PFFA/GDP). We also control for the overall development of the countries with a proxy of GDP per capita in constant dollars.

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change in stock market depth and liquidity, change in private bond market depth, and changes in pension fund size are uncorrelated with slow-moving country-specific characteristics such as demographic structures, past policy choices regarding pension system design, and so on. This is inappropriate.

[3] We also tried classifying the countries based on their stock market development using stock market capitalization over GDP, total stock value traded over GDP, and total value traded over market capitalization. For our sample of countries, the results of these classifications are the same.

The data on pension fund financial assets are from the OECD Institutional Statistical Yearbook, OECD Global Pension Statistics, and various national sources. Stock market capitalization, stock value traded, private bond market capitalization, and other macroeconomic and financial data are from the World Development Indicators, the IMF International Financial Statistics, the MSCI stock indices, and Beck, Demirguc-Kunt, and Levine (2009). In this study, we cover 32 developed and emerging market countries. The panel data is unbalanced with an average length of 18.5 years per country.

// Table 1 About Here //

Table 1 provides the means of the selected variables over the sample periods used in our regressions for each country. Countries are classified by their level of financial development. The table shows that, relative to GDP, countries with a 'high' level of financial development generally have a larger stock market capitalization, stock value traded, and private bond market capitalization, as well as more pension fund assets (on average, 104.6%, 86.9%, 36.4%, and 40.4%, respectively) than the 'low' level countries (on average, 38.6%, 16.5%, 22.7%, and 12.6%, respectively).

// Figure 1 About Here //

Figure 1 shows the positive correlation between the average sizes of pension fund financial assets and the stock and bond markets during 2003-2007. We see the clear positive correlation between pension fund financial assets and stock market capitalization and value traded, with correlation coefficients of 0.7283 and 0.6424, respectively. In countries such as Australia, Finland, Netherlands, Switzerland, the United Kingdom, and the United States, the financial assets held by pension funds account for more than 50% of the GDP, while the stock market capitalization and value traded are larger than 100% of the GDP. For bond markets, though, the correlation is positive but less prominent, as its value is 0.2330.

// Figure 2 About Here //

Figure 2 presents the association between the growth in pension fund financial assets and the growth in stock market depth, stock market liquidity, and private bond market depth between 2003 and 2007. Again, the relationships are positive, indicating that countries with faster growing pension funds also tend to witness higher growth for their stock and bond markets, though the relationship is less strong for bond markets. The correlations between the changes in pension fund financial assets and the changes in stock market capitalization, stock value traded, and private bond market capitalization are 0.4141, 0.3979, and 0.2126, respectively.

4. Results

Though the previous discussion highlights the positive relationship between pension fund size and capital market development, regression analysis is required to know about the significance and causality behind this relationship. We estimate a dynamic panel data model by including the one-year lagged dependent variable as an explanatory variable, implying that our results focus on short-term dynamics. All the explanatory variables are used in lag form to avoid potential endogeneity problems and thus ensure that the direction of causality is from the explanatory variables to the dependent variable, but not vice versa.[4] We use a bias-corrected LSDV estimator. In addition, we provide the estimated results from the differenced GMM estimator as a check of the robustness.

// Table 2 About Here //

Table 2 provides the regression results for stock market capitalization, stock value traded, and private bond market capitalization estimated from the entire sample. The results from these bias-corrected LSDV estimators provide support that the growth of pension fund financial assets is positively associated with the growth of stock market capitalization, stock value traded, and private bond market capitalization. The size of the impacts is relatively large for stock markets compared to bond markets. For instance, a one percentage point increase in pension fund financial assets relative to GDP, on average, leads to 0.30 and 0.625 percentage point increases in stock market capitalization and stock value traded, respectively, in the next period, while private bond market capitalization (relative to GDP) increases by 0.094 percentage points. The GMM estimators also provide similar patterns for pension fund assets, though the coefficients are larger than those obtained with the bias-corrected LSDV estimators.[5]

As well, each regression shows a strong persistence of the dependent variable, as the coefficient of the lagged dependent variable is strongly statistically significant. The coefficients for the lagged dependent variables estimated from GMM are smaller though, and this is consistent with the Monte Carlo experiments showing the negative finite sample bias in

[4] However, another issue about causality is the possibility that pension fund and capital market size may be jointly determined by other exogenous factors. These are commonly slow-moving factors, which include demographic structure, trade openness, level of economic development, and the legal framework, all of which capture the cross-country differences in explanations for the differing development of the capital markets and pension funds. In a separate appendix available upon request, we test whether or not these slow moving factors jointly determine our dependent and explanatory variables; that is, we want to show that our results are not a consequence of the joint determination by such exogenous factors. We find that the coefficient of the 'exogenous' component of pension funds has a positive and statistically significant impact on stock market and private bond market capitalization, giving support that our results for the impact of pension funds on capital markets are not the outcome of the joint determination by other slow-moving factors.

[5] For consistency of the GMM estimator, two specification tests are required: Test of autocorrelation and Sargan test of over-identifying restrictions. Our test results show that the hypothesis of 2nd order autocorrelation for the transformed error terms is not rejected, indicating the non-existence of autocorrelation. The Sargan test also fails to reject the null hypothesis, suggesting that the moment conditions are satisfied. The results of these two specification tests support the validity of using the GMM estimator.

estimating the coefficients of the lagged dependent variables with GMM estimators (Judson and Owen, 1999; Kiviet and Bun, 2001).

Other variables we control for are less commonly significant, but at least both estimation procedures lead to coefficients with the same signs. Focusing on the LSDVC estimates, real stock returns have a positive and statistically significant impact on stock value traded, yet are negative for bond market capitalization. This is expected, as higher real returns on stocks will induce higher demand and substitution away from bonds. Volatility for real stock returns shows negative association with stock market indicators but is positive for bond markets. However, it is only statistically significant for stock market capitalization. The coefficient of inflation is positive and statistically significant (at the 10 percent significance level) only for bond market capitalization, while inflation volatility has a negative association with all stock and bond indicators, but is statistically significant only for stock market depth. Meanwhile, the change in real interest rates and their volatility do not impact the capital market variables. GDP per capita, which controls for overall economic development in the country, is statistically significantly and positively associated with stock valued traded, but not with stock market and bond market depth.

// Table 3 About Here //

Overall, we have shown that the growth of pension fund financial assets leads to the development of stock markets and private bond markets for the data as a whole. Next, we seek to determine if the impacts of pension funds are different between countries with 'high' and 'low' levels of financial development. Tables 3, 4, and 5 report the results for stock market capitalization, stock value traded, and private bond market capitalization, respectively, for the two subgroups of countries classified with 'high' and 'low' financial development. From Table 3, the coefficient of pension fund financial assets (relative to GDP) is positive and statistically significant for countries with 'high' financial development, giving support for the positive impact that pension funds have on stock market depth. However, this coefficient is smaller and not statistically significant for countries with 'low' levels of financial development. The impact of pension fund financial assets on stock market liquidity, as shown in Table 4, is strongly significant only in countries with a 'high' level of financial development as well. Again, the impact is insignificant in countries with 'low' development. Table 5 similarly shows that pension funds help stimulate the development of private bond market depth only for the 'high' development countries. The findings also suggest that the growth of pension funds has a larger impact on stock markets than on private bond markets. For instance, a one percentage point increase in pension fund financial assets over GDP in countries with 'high' financial development leads, on average, to an increase in stock market

capitalization and stock value traded as a proportion of GDP of 0.397 and 0.488 percentage points, respectively. Private bond market capitalization increases by 0.114 percentage points.

// Table 4 About Here //

The GMM estimation results provide similar interpretations, as we just described, which demonstrates the robustness of our findings, though in every case GMM produces larger impacts for pension funds than do the bias-corrected LSDV estimators. One difference is that for countries with 'low' financial development, the impact of pension funds is statistically significant for bond markets as well. This was not found with the more reliable LSDVC estimates.

// Table 5 About Here //

5. Conclusion

As a result of pension system reform, pension fund assets are growing rapidly and are increasingly providing a source of investment funds to their domestic financial markets. Pension fund investments are expected to increase the availability of long-term funds, enhance competition, induce financial innovation, and improve corporate governance. To the extent that such financial market improvements are related to financial market size and activity, our study confirms only to an extent the existence of positive impacts from pension funds on the development of stock markets and private bond markets. Overall, we find that the impact of pension funds on capital market development differs significantly according to country's level of financial development. In the short run dynamics of capital markets, the countries with well-developed financial systems generally can expect to enjoy significant benefits from the growth of their pension funds, while the evidence of such benefits is much less clear for countries with 'low' financial development.

These findings suggest that as a whole, the countries with 'low' financial development are not doing enough to take advantage of their pension funds. Examples in Iglesias and Palacios (2000) and Vittas (2000) suggest that pension assets in many countries are used to finance government deficits or to reward politically connected but inefficient investment projects without impacting the country's development or growth. Vittas (2000) further argues that for pension funds to have a positive impact on capital market development, they need to reach sufficient size, their regulations must allow for a variety of investments and not otherwise prohibit investments in equities, and optimal investments must be pursued. As well, investment options in 'low' development countries are often riskier, which can otherwise deter pension fund investments that could stimulate financial markets. Raddatz and Schmukler (2008) also cite for the case of Chile that the large size of the pension fund relative to domestic financial markets, and the buy-and-hold strategies employed by pension funds, may

decrease the overall trading volume of securities. The findings here provide quantitative support for these explanations.

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Table 1: In-Sample Country Means for Selected Variables

Country	Periods	MC/GDP %	VT/GDP (%)	PBMC/ GDP (%)	PFFA/ GDP (%)	Real Stock Return (%)	Inflation (%)	Real Int. Rate (%)	Financial index
High Financial Development Countries									
Australia	1988-2008	87.06	54.89	28.72	55.49	7.39	3.32	2.50	0.12
Canada	1980-2008	72.52	40.39	21.53	39.75	8.84	3.73	1.40	0.23
Finland	2001-2008	112.04	145.47	23.00	60.51	-3.88	1.77	0.87	0.28
Germany	1980-2008	31.60	35.68	45.61	3.04	10.22	2.41	1.99	0.11
Italy	1990-2008	34.69	37.20	37.09	4.13	6.35	3.33	0.56	-0.02
Japan	1980-2007	74.81	50.13	43.86	13.44	7.63	1.25	0.58	0.58
Korea	1989-2008	50.32	94.99	47.46	8.27	9.90	4.58	2.94	0.57
Malaysia	1989-2008	163.94	70.90	40.80	46.86	10.39	3.04	1.87	0.15
Netherland	1980-2008	73.56	71.98	43.44	81.48	12.61	2.53	1.13	0.68
Singapore	1989-2008	166.49	90.29	15.88	58.98	8.62	1.80	0.44	0.40
South Africa	1994-2008	186.13	66.29	13.10	50.91	10.39	6.66	3.99	0.20
Spain	1994-2007	72.21	111.01	24.54	7.11	15.89	3.21	0.38	0.54
Sweden	1990-2008	89.39	86.49	48.01	2.76	13.65	2.54	1.13	0.28
Switzerland	1999-2007	259.29	240.13	36.82	98.86	5.64	0.93	0.20	1.24
United Kingdom	1980-2008	105.77	81.69	15.59	57.85	8.73	4.77	1.00	0.67
United States	1980-2008	93.94	113.11	96.77	57.48	9.23	3.85	2.39	0.95
Average		104.61	86.92	36.39	40.43	8.85	3.11	1.46	0.44
Low Financial Development Countries									
Agentina	1996-2007	39.75	3.87	6.58	8.52	20.85	6.09	4.32	-0.75
Austria	1993-2008	23.90	10.80	34.99	3.07	7.56	2.06	0.48	-0.35
Begium	1980-2008	45.12	12.95	44.41	3.01	13.07	3.16	2.75	-0.23
Chile	1989-2008	89.42	10.27	15.91	44.57	18.14	8.41	3.73	-0.41
Colombia	1994-2008	21.54	2.26	0.50	5.49	19.38	11.41	4.63	-0.79
Czech Republic	1996-2008	24.88	14.73	6.96	2.88	16.24	4.40	-0.99	-0.50
Denmark	1988-2008	48.62	32.32	112.52	21.78	13.14	2.39	1.81	-0.07
Hungary	1996-2008	25.65	19.49	2.93	5.08	20.08	9.49	1.05	-0.48
Israel	2001-2008	81.58	46.49		54.16	4.24	1.96	2.64	-0.17
Mexico	1997-2008	26.32	7.67	11.71	4.59	14.05	8.35	-1.48	-0.74
Norway	1981-2006	28.66	21.34	21.41	5.06	12.18	4.28	2.07	-0.16
Peru	1994-2008	33.94	4.30	3.11	7.59	22.53	5.96	0.99	-0.75
Poland	1999-2008	24.97	9.12		6.33	7.56	3.91	2.02	-0.66
Portugal	1989-2008	32.11	20.25	20.30	9.35	5.29	4.95	1.18	-0.08
Sri Lanka	1994-2008	15.32	2.54		15.84	6.08	10.68	-0.97	-0.76
Thailand	2000-2008	56.12	45.40	13.86	4.71	10.06	2.82	-0.36	-0.08
Average		38.62	16.49	22.71	12.63	13.15	5.64	1.49	-0.44

Note: The data for PBMC/GDP is available only since 1990 and is not available for Israel, Poland, and Sri Lanka.

Table 2: Impact of Pension Funds on Capital Markets

	MC/GDP		VT/GDP		PBMC/GDP	
	GMM	**LSDVC**	**GMM**	**LSDVC**	**GMM**	**LSDVC**
Explanatory Variables are Lagged						
Lagged dependent variable	0.548***	0.639***	0.630***	0.720***	0.839***	0.956***
	(0.0459)	(0.0437)	(0.0519)	(0.0445)	(0.0494)	(0.0347)
PFFA/GDP	0.350***	0.301**	0.750***	0.625***	0.112***	0.0939**
	(0.111)	(0.147)	(0.257)	(0.188)	(0.0293)	(0.0389)
Real Stock Returns	0.0310	0.0341	0.142*	0.140**	-0.0216**	-0.0190*
	(0.0475)	(0.0566)	(0.0754)	(0.0673)	(0.0106)	(0.0102)
Real Stock Volatility	-0.294***	-0.276*	-0.219	-0.221	0.00863	0.00210
	(0.106)	(0.160)	(0.337)	(0.193)	(0.0193)	(0.0258)
Inflation	-0.316	-0.250	1.026**	0.592	0.0254	0.135*
	(0.471)	(0.442)	(0.506)	(0.514)	(0.133)	(0.0779)
Inflation Volatility	-3.524***	-3.428**	-0.512	-0.450	-0.242	-0.466
	(0.872)	(1.376)	(0.825)	(1.624)	(0.280)	(0.295)
Real Interest Rate	-0.380	-0.334	0.787	0.542	0.139	0.139
	(0.519)	(0.528)	(0.702)	(0.627)	(0.116)	(0.103)
Real Interest Volatility	2.564**	2.375	0.501	0.803	0.0817	0.0374
	(1.220)	(1.673)	(1.314)	(1.988)	(0.286)	(0.276)
GDP/Capita	-6.31e-06	-3.49e-06	3.27e-05*	2.67e-05***	5.38e-06**	1.69e-06
	(1.25e-05)	(7.26e-06)	(1.73e-05)	(9.42e-06)	(2.13e-06)	(1.22e-06)
Observations	528	560	528	560	413	442
Groups	32	32	32	32	29	29
Test of 1st order autocorrelation (p-value)	0.0326		0.0032		0.0145	
Test of 2nd order autocorrelation (p-value)	0.8998		0.5668		0.1226	
Sargan Test (p-value)	0.4485		0.8040		0.1058	

*Note: - Standard errors are in parentheses. Standard errors of GMM are heteroskedastic-robust, and the standard errors of LSDVC have been derived by setting the number of bootstrap repetitions to 100. Year dummies are also included. ***, **, * signify statistical significance at the 1%, 5%, and 10% levels, respectively.*

Table 3: Impact of Pension Funds on Stock Market Capitalization by Level of Financial Development

	HIGH Financial Development		LOW Financial Development	
	GMM	**LSDVC**	**GMM**	**LSDVC**
Explanatory Variables are Lagged				
MC/GDP	0.581***	0.654***	0.495***	0.579***
	(0.0438)	(0.0590)	(0.0808)	(0.0628)
PFFA/GDP	0.459***	0.397**	0.299	0.237
	(0.135)	(0.190)	(0.301)	(0.243)
Real Stock Returns	0.0333	0.0416	0.0134	0.0146
	(0.111)	(0.131)	(0.0375)	(0.0411)
Real Stock Volatility	-0.367**	-0.367	-0.132	-0.132
	(0.177)	(0.238)	(0.0938)	(0.119)
Inflation	-1.230	-1.257	-0.233	-0.231
	(0.959)	(1.292)	(0.393)	(0.304)
Inflation Volatility	-0.522	0.0260	-3.919***	-3.930***
	(2.856)	(4.711)	(0.980)	(0.854)
Real Interest Rate	-0.616	-0.525	-0.563	-0.577
	(0.863)	(1.190)	(0.378)	(0.381)
Real Interest Volatility	0.0304	-0.437	3.301**	3.215***
	(3.483)	(4.490)	(1.385)	(0.945)
GDP/Capita	-6.70e-06	-2.60e-06	6.02e-06	5.58e-06
	(2.06e-05)	(1.16e-05)	(5.24e-06)	(9.10e-06)
Observations	306	322	222	238
Groups	16	16	16	16
Test of 1st order autocorrelation (p-value)	0.0434		0.0290	
Test of 2nd order autocorrelation (p-value)	0.8959		0.1821	
Sargen Test (p-value)	1.0000		1.0000	

Note: - See note in Table 2.

Table 4: Impact of Pension Funds on Stock Value Traded by Level of Financial Development

	HIGH Financial Development		LOW Financial Development	
	GMM	**LSDVC**	**GMM**	**LSDVC**
Explanatory Variables are Lagged				
VT/GDP	0.646***	0.728***	0.546***	0.635***
	(0.0613)	(0.0588)	(0.0937)	(0.0657)
PFFA/GDP	0.602**	0.488**	0.0332	0.0311
	(0.271)	(0.238)	(0.0769)	(0.146)
Real Stock Returns	0.213	0.217	0.0531*	0.0530**
	(0.176)	(0.162)	(0.0295)	(0.0258)
Real Stock Volatility	-0.447	-0.435	-0.0826*	-0.0798
	(0.643)	(0.295)	(0.0450)	(0.0734)
Inflation	1.008	0.992	0.0719	0.0612
	(1.197)	(1.620)	(0.165)	(0.190)
Inflation Volatility	0.885	0.691	0.0255	-0.00751
	(3.766)	(5.859)	(0.256)	(0.530)
Real Interest Rate	0.814	0.701	0.143	0.140
	(1.592)	(1.484)	(0.184)	(0.235)
Real Interest Volatility	-0.312	-0.637	0.218	0.205
	(5.158)	(5.572)	(0.397)	(0.589)
GDP/Capita	3.30e-05	2.80e-05*	2.22e-05***	1.83e-05***
	(2.79e-05)	(1.52e-05)	(3.58e-06)	(6.83e-06)
Observations	306	322	222	238
Groups	16	16	16	16
Test of 1st order autocorrelation (p-value)	0.0044		0.0115	
Test of 2nd order autocorrelation (p-value)	0.6603		0.5635	
Sargen Test (p-value)	1.0000		1.0000	

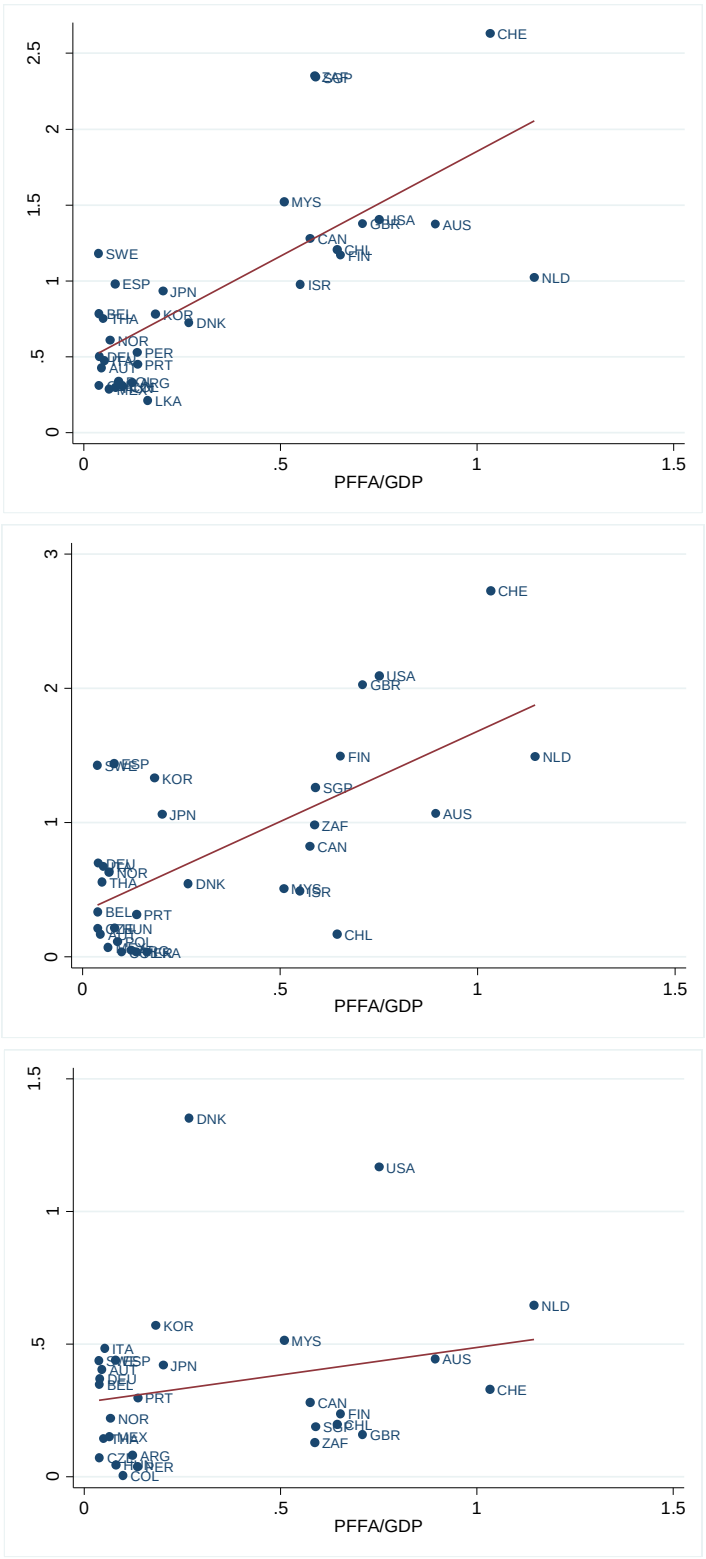
Note: - See note in Table 2.

Table 5: Impact of Pension Funds on Private Bond Market Capitalization by Level of Financial Development

	HIGH Financial Development		LOW Financial Development	
	GMM	**LSDVC**	**GMM**	**LSDVC**
Explanatory Variables are Lagged				
PBMC/GDP	0.889***	0.944***	0.803***	0.968***
	(0.0475)	(0.0378)	(0.0711)	(0.0747)
PFFA/GDP	0.151***	0.114***	0.182**	0.0833
	(0.0300)	(0.0368)	(0.0824)	(0.0975)
Real Stock Returns	-0.0457***	-0.0358**	-0.00979	-0.00744
	(0.0155)	(0.0151)	(0.0110)	(0.0111)
Real Stock Volatility	0.0321	0.0130	-0.0161	-0.00789
	(0.0322)	(0.0366)	(0.0141)	(0.0319)
Inflation	-0.0824	0.169	0.0149	0.0657
	(0.179)	(0.183)	(0.133)	(0.106)
Inflation Volatility	0.199	-0.0161	-0.562*	-0.646*
	(0.769)	(0.775)	(0.306)	(0.338)
Real Interest Rate	0.261	0.374**	0.0385	0.00742
	(0.248)	(0.176)	(0.0731)	(0.129)
Real Interest Volatility	-0.991	-0.813	0.400	0.306
	(0.638)	(0.761)	(0.276)	(0.252)
GDP/Capita	7.94e-06***	1.94e-06	4.05e-06	1.65e-06
	(2.77e-06)	(1.87e-06)	(3.29e-06)	(1.75e-06)
Observations	241	257	172	185
Groups	16	16	13	13
Test of 1st order autocorrelation (p-value)	0.0291		0.1886	
Test of 2nd order autocorrelation (p-value)	0.4480		0.0594	
Sargen Test (p-value)	0.3852		0.7637	

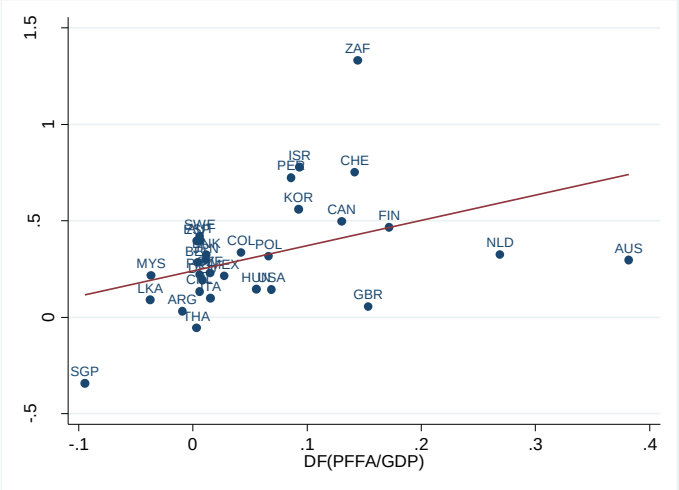
Note: - See note in Table 2.

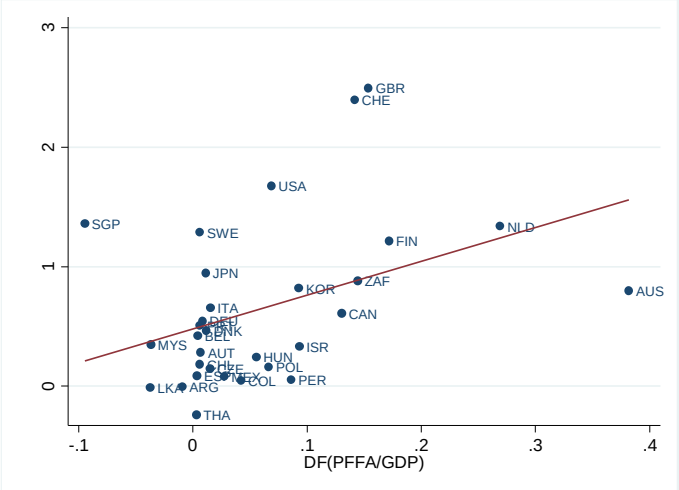
Figure 1 : Average Pension Funds Financial Assets (PFFA), Stock Market Capitalization (MC), Valued Traded (VT), and Private Bond Market Capitalization (PBMC), 2003-2007

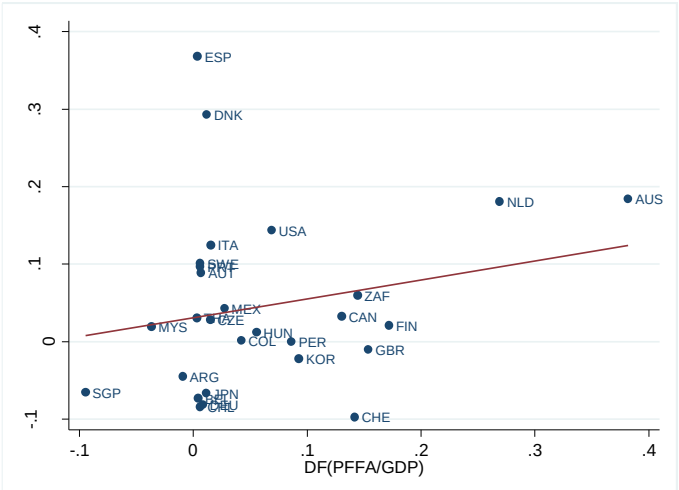


Source: OECD Statistics, WDI, IFS, and national sources

Figure 2 : Changes in Pension Funds Financial Assets (PFFA), Stock Market Capitalization (MC), Valued Traded (VT), and Private Bond Market Capitalization (PBMC) between 2003-2007







Source: OECD Statistics, WDI, IFS, and national sources

The Current Pension Fund Model. The Role of the Capital Market. Investment Objectives. The Main Pitfalls.Â Conclusions. Developing Strong Pension Funds â€“ Financial Market Preconditions, and Local Market Development. EBRD Conference on Pension Systems in Emerging Europe, London 1 April 2011. Knut N. Kjaer.