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Institutional Investors, Financial Sector Development And Economic Growth in OECD Countries

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Abstract:
This paper studies the role of institutional investors (pension fund, insurance companies and investment companies) in the development of the financial sector and economic growth in OECD countries by employing a dynamic panel VAR. While pervious studies in this area have mainly focused on contractual savings institutions of pension funds and insurance companies, we provide a consistent analysis of institutional investors that includes pension funds, insurance companies, and investment companies both at the aggregated and disaggregated levels. At the aggregate level, we found that institutional investors significantly Granger causes stock market developments and economic growth. However, we do not find such evidence with the banks. At the disaggregated level, we found that market capitalization Ganger causes the development of contractual savings institutions of pension funds and insurance companies. While these contractual savings institutions Granger causes liquidity and turnover in the stock market, the results suggest that the maturity and large coverage of these institutional investors have diluted the impact in deepening the stock market. In turn, the 'risk averseness' of these contractual savings institutions in holding large capitalized and diversified stock portfolio verifies the reverse causality evidence. Contrary to a passive 'buy and hold' strategy, the unidirection causality to both market liquidity and turnover verifies that contractual savings institutions actively manage their portfolios. Another key finding of this study is the significant role of investment companies in Granger causing both financial sector development and economic growth. While both contractual savings institutions exhibit uni-directional causality on economic growth, we found a dynamic relationship between investment companies and growth due to the risk taking activities of investment companies.

JEL classification: C33, G21, G22, G23, G28
Keywords: Institutional Investors, Financial Sector Development, Economic Growth, Causality

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1. Introduction

The importance of financial institutions in economic development, especially the role of stock markets and banks is greatly discussed in both theoretical and empirical studies (see Levine (2003) for the survey of the literature). The key findings of these studies are that countries with better developed financial institutions tends to growth faster, particularly the size of the banking system and the liquidity of the stock markets tend to have strong positive impact on economic growth (Beck and Levine, 2002; Beck et. al., 1999; Arestis et. al., 2001). As compared to stock markets and financial intermediaries, studies on the role and function of non-bank financial institutions (NBFI) in the overall economic development have been very sparse in the literature. Although most studies predict the impact of financial institutions on economic growth, they do not explicitly discuss the issues of causality and the impact of non-bank financial institutions on economic growth. In this paper, we explicitly study the impact of non-bank financial institutions, in particular the impact of institutional investors on economic growth of the OECD countries in a dynamic framework.

Non-bank financial institutions, especially institutional investors such as pension funds, insurance companies and investment companies, have increasingly become an important component of the financial sector[1]. Recent studies tend to highlight the importance of institutional investors in the overall development of the financial markets in OECD countries over the past 3 decades (Merton and Bodie, 1995; Vittas, 1998; Impavido et. al., 2000). However, the key shortcomings of these studies are that they do not address the impact of the institutional investors on the development of the financial sector and the overall economic growth of the domestic

[1] Institutional investors as defined by OECD Institutional Investors Statistical Yearbook include *pension funds*, *insurance companies* and *investment companies*. In this study we follow this definition very closely.

economy. In fact, most of these studies have only focused disproportionately on the study of pension funds. The key thrust of the paper is to study the impact of non-bank financial institutions on economic growth in a dynamic framework of the panel vector autoregressive model (PVAR). The main objective of this paper is to analyze the causal relationship between the growth of institutional investors, financial sector development (banks and stock market) and economic growth. The paper studies two key causality issues with respect to institutional investors. The paper studies whether the financial sector development (banking and stock market) is a precondition for the growth of institutional investors or whether institutional investors stimulate financial market developments. Secondly, the paper also studies whether institutional investors contribute directly to economic growth, even after controlling for bank and stock market contributions.

This study incorporates the 'dynamic' causality role of institutional investors in a PVAR framework[2]. The advantage of using the PVAR is that in addition to the cross-sectional variability, it also accounts for the time-series variability in the data, thereby providing the dynamic framework to study the causal relationship between variables in a panel framework. In a purely cross-sectional analysis, the unobserved country-specific effect is highly correlated with the error term and hence the regression leads to biased estimation. To control for the unobserved effects, Anderson and Hsiao (1981) propose to 'first-difference' the estimation equations to eliminate the unobserved effects and then use the instrumental variables to control for the endogeneity in the model. However, Arellano and Bond (1991) highlighted that the instruments do not completely controls for the potential endogeniety of all regressors.

[2] See Rousseau and Wachtel (2000) on the application of PVAR framework on the study of equity markets and economic growth. Our study fundamentally differs from theirs in terms of focusing on the dynamic relationship between institutional investors, financial markets (stock markets and banks) and economic growth.

As proposed by Arellano and Bond (1991), we used a General Methods of Moments (henceforth, GMM) technique that uses instruments based on previous realizations of the explanatory variables to account for the endogeniety in our model, which robustly accounts for the endogeniety of the regressors and hence provides more *efficient* and *unbiased* estimation. The study covers 23 OECD countries over a span of thirteen years from 1988 to 1999.

The results of our study suggest that institutional investors have strong causal impact on stock market development and economic growth, but not on the development of the financial intermediaries. The disaggregated analysis of different components of institutional investors indicates that the stock market variable of market capitalization Ganger causes the development of contractual savings institutions of pension funds and insurance companies. While these contractual savings institutions Granger causes liquidity and turnover in the stock market, the results suggest that the maturity and large coverage of these institutional investors have diluted the impact in deepening the stock market. In turn, the 'risk averseness' of these contractual savings institutions in holding large capitalized stock portfolio verifies the reverse causality evidence. Contrary to a passive 'buy and hold' strategy, the uni-direction causality to both market liquidity and turnover verifies that contractual savings institutions actively manage their portfolios. There is also strong evidence that the activities of the investment companies Granger causes both the financial markets and economic growth.

The rest of the paper is structured as follows. Section 2 identifies the channels through which institutional investors augments the efficiency of financial markets. In this section, possible economic growth impact through the financial markets is also discussed and a preliminary description of institutional investors in OECD countries

is provided. Section 3 outlines the data and panel methodology employed in this paper. Results are discussed in Section 4. The conclusions are given in Section 5.

2. Institutional Investors, Financial Markets and Economic Growth

2.1 Institutional Investors and Financial Sector Development

One of the key contributions of institutional investors is that they tend to improve the overall *efficiency* of the financial sector (Merton and Bodie, 1995; Blommestein and Funke, 1998; Davis and Steil, 2001). Basically, there are six functions that institutional investors perform, regardless of the type of agent or institutional financial functional form. Vittas (1998) clearly highlights that institutional investors have played a key role in improving the clearing and settling systems to facilitate the exchange of goods, services and assets. This include improvements in clearing facilities, establishment of central depository agencies, pressure for reliable back-office operations and the disintermediation of the bank denominated wholesale financial markets through the development of money market funds and other instruments like CDs, CP, deposits notes, swaps and repos. Secondly, institutional investors' main contribution to a market is that they are a large and reliable source of financial resources. The size and economies of scale enables these institutional investors to pool and maximize return for a given risk profile of individual investors. Thirdly, institutional investor provides more efficient channels to allocate economic resources across geographic regions, industries and also over time. While there is still controversy whether institutional investors have contributed to a *quantitative* increase in household savings, the general consensus is that institutional investors have *qualitatively* increased the supply of long-term funds to capital markets (Impavido et. al., 2002). Institutional investors have also enabled better diversification opportunities across countries and industries. Fourthly, the role of institutional

investors in managing uncertainty and controlling risk through risk pooling and risk sharing has led to the development of innovative financial products and investment strategies. This include financial innovations like the zero coupon bonds, index futures, securitization and the wide use of derivatives. Fifth, institutional investors, bestowed with economics of scale, good information and low transactions costs, are likely to provide better price information and improve the adjustment of asset prices to fundamental values. Study by Davis (1988) shows that the portfolio distributions of life insurers and pension funds in five of the G7 countries are strongly influenced by relative asset returns, particularly where there are few regulations governing portfolio distributions and low transactions costs, as in the United Kingdom and the United States[3]. Superior ability to employ price information is also another advantage of institutional investors. For example, Field (1995) highlights that initial public offerings subscribed largely by institutional investors tend to do well as opposed to those purchased largely by the general public. Finally, institutional investors also have a comparative advantage over individual investors in dealing with issues of corporate governance. The size and voting weights of institutional investors helps alleviate the asymmetric information problem and principal agent dilemma in corporate governance.

2.2 Institutional Investors and Economic Growth

As institutional investors play an important role in the development of financial markets, they could also contribute to overall economic growth of the domestic economy. Given the diverse role of each component of the institutional investors, this section seeks to highlight the main contribution of pension fund, insurance companies and investment companies to economic growth. Institutional investors interact

[3] These results did not hold where transactions costs are high and regulations are strict as in Germany, Japan and Canada.

dynamically with both financial sector development and economic growth. Implicit in the discussion is the focus on a uni-directional relationship from institutional investor development to both financial sector development and economic growth. However, this relationship is dynamic with a possibility of reverse causality from either economic growth or financial sector development to institutional investors. Interestingly the causality permutation between institutional investor, financial sector development and economic growth increases once pension funds, insurance companies and investment companies are examined individually.

2.2.1 Pension Fund and Economic Growth

An ageing population and growing health care cost have made governments to move from a defined benefit pay-as-you-go social pension system towards a fully-funded defined contribution system operated by either the government or the private sector, which is expected to reduce government expenditure. Essentially, pension fund lengthens the term structure of retail savings. In turn, this promotes the development of long-term financing markets and balances the need for foreign capital inflows especially in developing countries[4] in financing costly and long-term development projects.

2.2.2 Insurance Companies and Economic Growth

Services conferred by the insurance companies are fundamental to economic growth. From a functional perspective, insurance services have important impact on economic growth (Skipper, 1998). Firstly, insurance companies promote financial stability and anxiety reduction through the indemnification of risk at the individual, societal, corporate and national level. Secondly, insurance companies are viable substitutes for costly government social security programs. Thirdly, insurance

[4] Holzmann (1997) estimates that Chile's long-term growth increased 1% to 3% from the effects of the pension reform operating via financial markets.

companies facilitate trade and commerce at both the domestic and international level. Moreover, insurance also facilitates innovation by offering to underwrite new risk especially in new growth areas like pharmaceuticals. Fourthly, an insurance company mobilizes savings on a contractual basis and transforms the short-term nature of retail savings to a longer-term basic, whilst maintaining liquidity for claims. Fifth, and perhaps the key role of insurance companies is the enhancement of risk management through effective risk pricing, transformation and pooling. Sixth, insurance companies encourages loss mitigation by the insured through efficient pricing and insurance availability. Finally, insurance companies foster a more efficient capital allocation through its prudent investment activities.

Economic growth, on the other hand, entails more complex loss exposure and greater risk. Risks that were traditionally managed at the individual and societal level can be effectively managed at the national and even international level. This highlights the possible reverse causality of economic growth causing growth in the insurance industry.

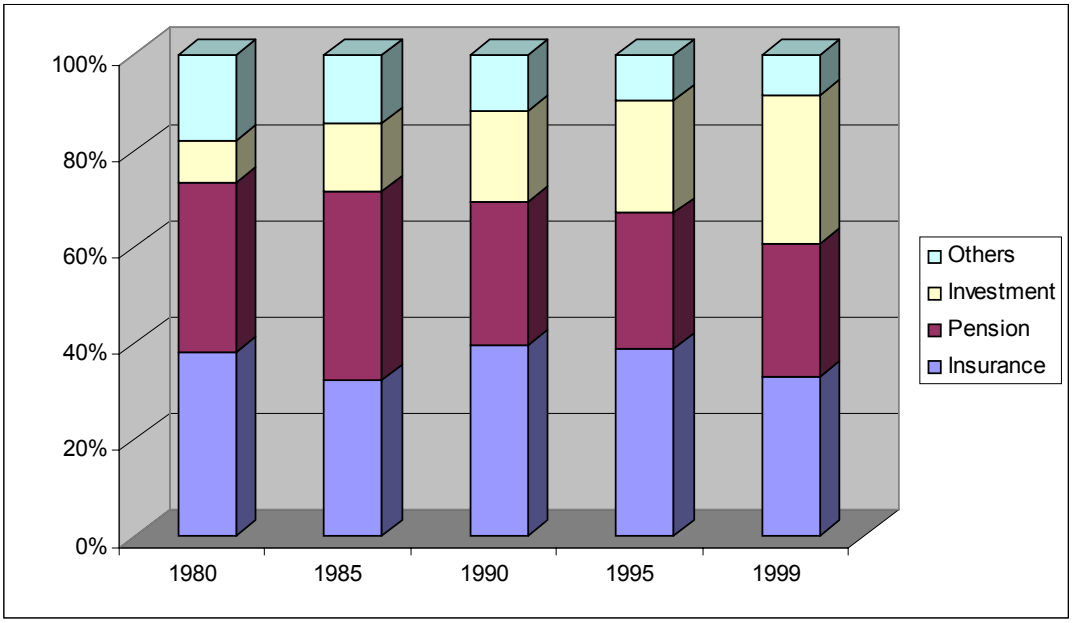
2.2.3 Investment Companies and Economic Growth

A key role of investment companies is its ability to pool and mobilize private savings for a large number of households. The ability of investment companies in providing liquidity according to the specific needs of its investors, introducing innovative product and investment strategies, exploiting arbitrage opportunities and diversifying investment across products and national boundaries will enhance the financial sector efficiency and this will have a positive spillover effect on the economy.

2.3 Institutional Investors in OECD Countries

There has been a rapid growth of the financial asset of institutional investors in OECD countries since 1980, rising from US$2500 billion in 1980 to nearly US$35000 billion in 1999 (OECD Institutional Investors Statistical Yearbook, 1999). The financial assets of various institutional investors in OECD countries are given in Figure 1. It is clear that the financial asset of pension funds has declined significantly from around 35 percent in 1980 to 28 percent in 1999. Insurance companies have relatively maintained its share but there is a significant growth of investment companies which accounts for almost 31 percent of all financial assets of institutional investors in 1999.

Figure 1: Financial Assets of Various Institutional Investors

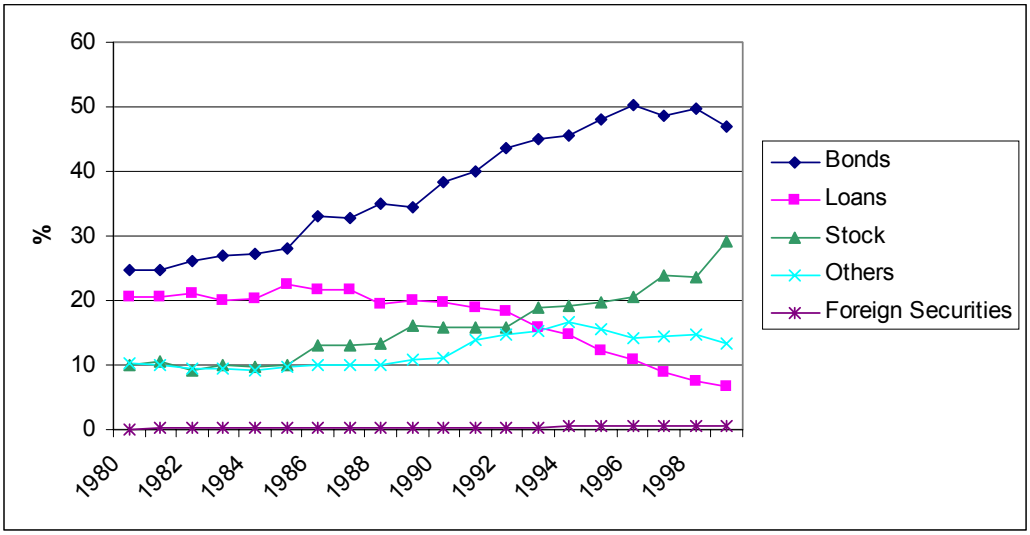


Source: OECD Institutional Investors Statistical Yearbook (various years)

The portfolio allocations of institutional investors are given in Figure 2. Generally, the financial assets of institutional investors are composed of bonds, loans, shares, foreign securities and other holdings (real estate, etc). Most institutional investors are either risk-adverse or are regulated by mandate to hold less risky assets

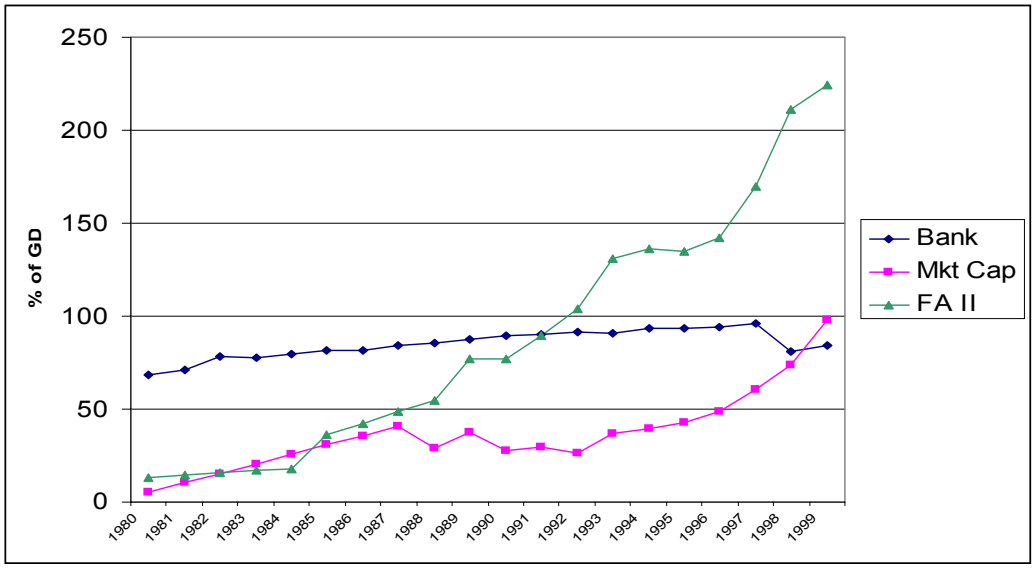
as indicated by the large shareholdings of bonds. We could observe some clear trends in Figure 2. It is clear that the size of stock holdings has increased to around 30 percent in 1999 from a base of 10 percent in 1980, which is mostly accounted by the declining loan holdings. Another key observation is the small amount of foreign securities held by institutional investors, which indicates a significant biasness towards domestic financial assets.

Figure 2: Portfolio Allocation of Institutional Investors in OECD Countries



Source: OECD Institutional Investors Statistical Yearbook (various years)

Figure 3: Institutional Investors, Banks and Stock Market



Source: OECD Institutional Investors Statistical Yearbook, World Development Indicators and the Emerging Stock Markets Factbook (various years).

The trends of financial assets of institutional investors (FA II), market capitalization of stock markets and domestic credit provided by the banking sector ratios to GDP are given in Figure 3. While the growth of domestic private credit provided by the banking sector has been relatively unchanged, both institutional investors and stock market capitalization have experienced a large growth, particularly in the 1990's. This high correlation between the financial assets of institutional investors and stock market capitalization in the 1990's suggest a strong dynamic relationship between institutional investment and stock market activities.

3. Data and Methodology

3.1 Data

Table 1 provides a brief summary of all the variables employed. The panel study consists of 23 OECD countries[5] from 1988 to 1999.

Table 1: The Description of the Key Variables Used in the Study

GDP	log [Real GDP (1995) in US dollars]
MC	log [Market Capitalization / GDP]
VT	log [Value Traded / GDP]
TR	log [Value Traded / Market Capitalization]
DC	log [Domestic credit provided by banking sector / GDP]
IINVEST	log [Financial Assets of Institutional Investors / (Financial Asset of Institutional Investors + Market Capitalization + Domestic credit provided by banking sector)]
Pen	log [Financial Assets of *Pension Funds* / (Total Financial Asset of Institutional Investors + Market Capitalization + Domestic credit provided by banking sector)]
Ins	log [Financial Assets of *Insurance Companies* / (Total Financial Asset of Institutional Investors + Market Capitalization + Domestic credit provided by banking sector)]
Invt	log [Financial Assets of *Investment Companies* / (Total Financial Asset of Institutional Investors + Market Capitalization + Domestic credit provided by banking sector)]

The key data for the analysis was collected from the Institutional Investors Statistical Yearbook (OECD) and the World Development Indicators (World Bank).

[5] These OECD countries include Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Italy, Japan, Korea, Luxembourg, Mexico, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, United Kingdom and United States.

The stock market dataset is gathered from the Emerging Stock Markets Factbook, OECD (various years).

The domestic credit provided by the banking sector to GDP is used as a measure of the activity of financial intermediaries in channeling savings to investors. Levine and Zervos (1998), Levine et. al. (1999) and Beck et. al. (1999) have employed this indicator in the examination of the impact of financial sector development on economic growth. It is vital to note that this indicator measures only the 'traditional' role of the banking sector in providing loans and advances and does not capture the growing importance of off-balance sheet activities (including the provision of insurance, pension and investment services) of the banking sector. Thus, this measure will be able to isolate the main credit activities of the financial intermediaries.

Beck et.al (1999) outline three key stock market indicators in measuring its size, activity and efficiency. Stock market capitalization to GDP ratio (MC) measures the size of stock market as it aggregates the value of all listed shares in the stock market. It is assumed that the overall stock market size is positively correlated with the ability to mobilize capital and to diversify risk at an economy wide basis[6]. However, the size of the stock market does not necessarily reflect its liquidity. Thus the level of the liquidity of the stock market in channelling capital is captured by the total value of stocks traded in the domestic stock exchanges to GDP ratio (VT). Liquidity in the stock markets reduces the disincentive to investments as it provides more efficient resource allocation and hence economic growth.

While MC captures the *size* and VT reflects the level of *liquidity*, the *efficiency* of the domestic stock market is captured by the turnover ratio (TR). The TR

[6] The main shortcoming of *Market Capitalization* is that theory does not suggest the mere listing of shares will influence resource allocation and growth. Levine and Zervos (1998) showed that *Market Capitalization* is not a good predictor of economic growth.

ratio is defined as the ratio of the value of total shares traded to market capitalization. A small but active stock market will have a high turnover ratio as compared to a large but less liquid stock market. In both these cases, the turnover ratio would provide a more robust indication of the activity of the stock market.

The role of institutional investors in this study is captured by the ratio of total financial assets of institutional investors to GDP. However, as most financial assets of institutional investors consist of loans, stock and bonds, we further normalized the total financial assets of institutional investors by dividing it with the sum of total financial assets of institutional investors, stock market capitalization and domestic credit provided by banking sector. This would provide a better weightage and proxy in measuring the 'aggregated' functionality of institutional investors[7]. We also further analyzed the impact of different components of institutional investor for pension funds, insurance companies and investment companies respectively. The total financial assets for pension funds (Pen), insurance companies (Ins) and investment companies (Invt) are similarly normalized with the procedure outlined above[8]. To measure the level of economic activity, we employ real gross domestic product (GDP) at 1995 US prices.

3.2 Dynamic Panel VAR

This paper employs a panel vector autoregressive (PVAR) model to analyze the impact of institutional investors on financial sector development and economic growth. This model combines the traditional VAR approach, which treats all the

[7] Studies by Catalan et. al. (2000) employ basic measures like contractual savings financial assets over GDP to capture the size of contractual savings institutions relative to GDP. This suffers from a major problem as financial assets of institutional investors would consist of stock portfolio holdings and hence augmenting a multicollinearity problem. Impavido et. al. (2003) improved upon this variable by employing a normalization procedure that is similar to this paper. They further confirm that this normalized variable corrects for price movements that might have caused correlation between institutional investors and financial sector development.

[8] In measuring the economic and financial impact of insurance companies, Ward and Zurbruegg (2000) used total insurance premium. Similarly, Outreville (1996) also used the ratio of gross domestic premiums to GDP in his studies of insurance companies in developing countries.

variables in the system as endogenous, with the panel data approach, which controls for unobserved individual heterogeneity. More specifically, a dynamic tri-variate PVAR model can be written as

$$y_{i,t} = \sum_{j=1}^{k} \alpha_{1,j} y_{i,t-j} + \sum_{j=1}^{k} \beta_{1,j} x_{i,t-j} + \sum_{j=1}^{k} \rho_{1,j} z_{i,t-j} + \eta_{1,i} + \vartheta_{1,t} + \varepsilon_{1,i,t} \qquad (1)$$

$$x_{i,t} = \sum_{j=1}^{k} \alpha_{2,j} y_{i,t-j} + \sum_{j=1}^{k} \beta_{2,j} x_{i,t-j} + \sum_{j=1}^{k} \rho_{2,j} z_{i,t-j} + \eta_{2,i} + \vartheta_{2,t} + \varepsilon_{2,i,t} \qquad (2)$$

$$z_{i,t} = \sum_{j=1}^{k} \alpha_{3,j} y_{i,t-j} + \sum_{j=1}^{k} \beta_{3,j} x_{i,t-j} + \sum_{j=1}^{k} \rho_{3,j} z_{i,t-j} + \eta_{3,i} + \vartheta_{3,t} + \varepsilon_{3,i,t} \qquad (3)$$

where each equation is estimated separately. In this specification, η_i capture all unobserved country-specific time invariant effects, ϑ_t is a full set of time dummies to account for trending behaviour and $\varepsilon_{i,t}$ is the random error term which is assumed not to be correlated across countries and time. The variables $X_{i,t}$, $Y_{i,t}$ and $Z_{i,t}$ are interchanged with the variables identified in Table 1[9].

Given the short time period in the data, we restricted the maximum lags to 2. In a PVAR model, the test on Granger causality is imposed on the respective lagged coefficients. For example, to test whether x Granger causes y in equation (1) requires a Wald test with the hypothesis of $\beta_{1,1} = \beta_{1,2} = 0$.

Although including lagged dependent variables in the panel enables the examination of the *dynamics* between the variables in study, Nickell (1981) [10] showed that this leads to biased estimation especially if the time dimension of the panel is

[9] For example in examining the impact of institutional investor (IINVEST) on stock market capitalization (MC) after controlling for banking effects (DC) in equation 1, the y-variable represents MC, x represents IINVEST and z represents DC. The dynamics of reverse causality is further examined in the specification of equation 2 and 3 respectively.

[10] The usual approach to estimating fixed effects models is by employing the least squares dummy variable (LSDV) estimator which tends to generate a biased estimate of the coefficients. Nickell (1981) derives an expression for this bias when there are no exogenous regressors, showing that the bias approaches zero as T approaches infinity. Judson and Owen (1997) showed that this bias can be as much as 20 percent even as T approached 30.

relatively short, like in this study. To improve the estimation, Anderson and Hsiao (1981) suggested a two-step instrumental variable (IV) procedure that includes first differencing the dynamic panel and instrumenting the difference equation with the lagged level or lagged difference[11] of the dependent variable, which are uncorrelated with the disturbance in the difference equation but correlated with the difference dependent variable. The model in first difference is given as:

$$\bar{y}_{i,t} = \sum_{j=1}^{k} \alpha_{1,j} \bar{y}_{i,t-j} + \sum_{j=1}^{k} \beta_{1,j} \bar{x}_{i,t-j} + \sum_{j=1}^{k} \rho_{1,j} \bar{z}_{i,t-j} + \bar{\vartheta}_{1,t} + \bar{\varepsilon}_{1,i,t} \qquad (4)$$

$$\bar{x}_{i,t} = \sum_{j=1}^{k} \alpha_{2,j} \bar{y}_{i,t-j} + \sum_{j=1}^{k} \beta_{2,j} \bar{x}_{i,t-j} + \sum_{j=1}^{k} \rho_{2,j} \bar{z}_{i,t-j} + \bar{\vartheta}_{2,t} + \bar{\varepsilon}_{2,i,t} \qquad (5)$$

$$\bar{z}_{i,t} = \sum_{j=1}^{k} \alpha_{3,j} \bar{y}_{i,t-j} + \sum_{j=1}^{k} \beta_{3,j} \bar{x}_{i,t-j} + \sum_{j=1}^{k} \rho_{3,j} \bar{z}_{i,t-j} + \bar{\vartheta}_{3,t} + \bar{\varepsilon}_{3,i,t} \qquad (6)$$

where $\bar{y}_{i,t} = \Delta y_{i,t} = y_{i,t} - y_{i,t-1}$, $\bar{x}_{i,t} = \Delta x_{i,t} = x_{i,t} - x_{i,t-1}$, and $\bar{z}_{i,t} = \Delta z_{i,t} = z_{i,t} - z_{i,t-1}$.

The IV estimation as proposed by Anderson and Hsiao (1981) does not necessarily yield efficient estimates, since it does not make use of all the available moment conditions and also does not account for the differenced structure of the new error terms. Arellano and Bond (1991) suggest a panel GMM estimation procedure that improves on Anderson and Hsiao's (1981) IV estimation[12]. More specifically, the GMM estimation procedure is employed to deal with two key issues in panel estimation: the endogeneity or non –orthogonality of the regressors that is reflected in the correlation between these variables and the error term, and second, the differenced error term is by construction correlated with the lagged dependent variables. The advantage of the GMM estimation procedure is that it employs *additional* linear

[11] Arellano (1989) shows that using the lagged difference as an instrument results in an estimator that has a very large variance. Arellano and Bond (1991) and Kiviet (1995) further confirm the superiority of using the lagged level as an instrument with simulation results.

[12] Arellano and Bond (1991) run a Monte Carlo experiment to judge the Anderson-Hsiao estimator against various GMM estimators and find that the GMM procedures produce substantial efficiency gains.

instrumental variables which uses *predetermined* lagged level as instruments to exploit a potentially large set of overidentifying restrictions to deliver consistent coefficient estimates. Generally the following moment conditions are applied:

$$E[Y_{it-j}.(\varepsilon_{it} - \varepsilon_{it-1})] = 0 \quad \text{for j} \geq 2$$

$$E[X_{it-j}.(\varepsilon_{it} - \varepsilon_{it-1})] = 0 \quad \text{for j} \geq 2 \qquad \text{- (7)}$$

In this paper, we employed a 'restricted GMM' estimation procedure as only appropriate and current lagged values are selected. This is because as Hsiao (2003: pp.90) found that while it is theoretically possible to add additional moment conditions to improve the asymptotic efficiency of the GMM estimation, it is doubtful how much efficiency gain can be achieved by using a huge number of moment conditions in a finite sample. Furthermore, if higher moment conditions are used, the estimator can be very sensitive to outlying observations. For example, Ziliak's (1997) simulation finds that the downward bias in GMM is quite severe as the number of moment conditions expands, outweighing the efficiency gains[13].

Arellano and Bond (1991) proposed two GMM estimators to estimate a dynamic panel, namely the one-step and the two-step estimator[14]. Bond (2002) and Bond and Windmeijer (2002) outlines the applicability of the one-step estimator in applied work due to the fact that the one-step estimator produces less biased and more efficient estimates that the two-step alternative. In our study, we used the one-step GMM estimator.

[13] Further usage of additional instruments like the lag of the first difference of the dependent and explanatory variables for the regression in levels as suggested by Arellano and Bover (1995) are not employed extensively due to the short panel. The extended GMM estimator; more frequently known as the *system* GMM estimator uses moment conditions well in excess of the number of unknown parameters and can therefore be subjected to important small sample bias.

[14] Generally, in the one-step estimation, the error terms are assumed to be independent and homoskedastic across countries and over time. This assumption corresponds to a specific weighting matrix that is used to produce one-step coefficient estimates. On the other hand, the two-step estimator employs the residuals obtained in the one-step estimator to construct a consistent estimate of the variance-covariance matrix, which is then used to re-estimate the parameters.

The consistency of the GMM estimator depends firstly on whether lagged values of the explanatory variables are valid instruments in the model outlined above and secondly if the assumption of no serial correlation in the errors holds. The specification test for the former involves the utilization of the Sargan test of over-identifying restrictions which tests the overall validity of the instruments by analyzing the moment conditions used in the estimation process. Failure to reject the null hypothesis gives support to the model. The second test examines the assumption of no serial correlation in the error term, $e_{i,t}$, by testing whether the differenced error term are second order serially correlated (Arellano and Bond, 1991). If the test fails to reject the null hypothesis of *absence* of second-order serial correlation, we conclude that the original error term is serially uncorrelated which gives support to the model.

4. Causal Relationship Between Economic Growth, Financial Sector Development and Institutional Investors in PVAR Framework

In this section, we will empirically analyze Granger causality between institutional investors, financial sector development and economic growth. Firstly we examine the aggregated impact of institutional investors directly on the development of financial institutions consisting of banks and stock market. Secondly we examine the relationship between institutional investors and economic growth.

4.1 Institutional Investors (Aggregated) and Financial Sector Development

Table 2 outlines a tri-variate PVAR model that examines the dynamic relationship between institutional investors, banking sector and various stock market indicators respectively. Specification tests of no second order serial correlation in the differenced error term and non-rejection of the Sargan over-identifying test supports the findings in our model[15]. The key finding of this study is that there is a strong

[15] Due to brevity, the results for the specification tests of no second order serial correlation and Sargan over-identifying test is not included in the main text but is available from the authors. The results of no

causal impact of institutional investors in OECD countries on the development of various aspects to the stock market characteristics.

Table 2: Tri-variate PVAR model of Granger Causality Test (Wald Test) for OECD countries with Institutional Investors and Financial Sector

Model	Effect (→) Cause (↓)	ΔIINVEST $_t$	Δ Stock $_t$	Δ DC $_t$
1	F-ΔIINVEST $_t$	-	0.0001 ***	0.5967
	F-ΔMC $_t$	0.0225 **	-	0.0865
	F-ΔDC $_t$	0.3135	0.1703	-
2	F-ΔIINVEST $_t$	-	0.0001 ***	0.6852
	F-ΔVT $_t$	0.5088	-	0.0480 **
	F-ΔDC $_t$	0.2134	0.7079	-
3	F-ΔIINVEST $_t$	-	0.0017 ***	0.6511
	F-ΔTR $_t$	0.9883	-	0.6934
	F-ΔDC $_t$	0.8353	0.5001	-

Note:
1) *, ** and *** denotes p-value Wald/ F-test rejection of Granger non-causality at the 10%, 5% and 1% levels respectively.
2) Time dummies and intercept are included in the estimation but are not reported.

From Table 2, we find that institutional investment Granger causes stock market capitalization, the value of stock traded and turnover ratio. This finding also is in line with earlier studies by Impavido et. al. (2000). However, as compared to our study, the previous studies focused solely on the impact of '*contractual savings*' institutions which only consists of pension funds and insurance companies. We also find some evidence of reverse causality, but this feedback is only apparent from the market capitalization rather than the liquidity or turnover of the stock market. There is also no causality either from institutional investors to the development of the banking sector or banking sector to the development of the institutional investors. This is intuitive as we have seen from Figure 3 in the previous section that the proportion of bank loans in the portfolio of institutional investors has decreased over time. As the banking variable is defined as the amount of domestic bank loans to the private sector, the

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second-order serial correlation and non-rejection of Sargan test holds for both aggregated and disaggregated analysis.

shrinking share of bank loans in the portfolios of institutional investors validates the insignificant relationship between banks and institutional investors. Besides this, there is a diminishing trend in the traditional activities of the banking sector in accepting loans and providing loans. Hence, the growth of institutional investors would directly erode the traditional role of the banking sector.

4.2 Institutional Investors (Aggregated) and Economic Growth

In Table 3, we extended the analysis by incorporating the possible impact from the development of institutional investors on economic growth. The key result supports our hypothesis that institutional investors have a significant direct causal impact on GDP, even after accounting for various financial market indicators. It is apparent that the channel of transmission is through the stock market as opposed to the banking sector as indicated by models 5, 6 and 7 in Table 3. This direct impact on GDP is statistically significant at the 5 percent level when market capitalization is employed, while it is statistically significant at the 1 percent level when both stock traded and turnover ratio are used. Furthermore, the direct impact of institutional investors on GDP is uni-directional with no feedback effect from GDP to institutional investors.

The impact of institutional investors on various financial indicators remains consistent to the earlier findings. For example, we found no effect of institutional investors on the banking sector. This result is similar to the one which we found earlier in Table 2. The high statistical significance (1 percent) of institutional investors is apparent when we employ the three different stock market indicators: stock market capitalization, stock traded and turnover ratio. While there is only uni-directional causality for the last two stock market indicators, again we found a bi-directional causality when market capitalization is employed. This suggests that

institutional investors not only Granger causes market capitalization, but the successful development of institutional investors also requires a certain threshold size in the stock market. This is illustrative as it shows that size rather than liquidity is the main criterion for the development of institutional investors.

Table 3: Tri-variate PVAR model of Granger Causality Test (Wald Test) for OECD countries with GDP, Institutional Investors and Financial Sector

Model	Effect (→) Cause (↓)	ΔIINVEST $_t$	ΔGDP $_t$	Δ Financial Sector $_t$
4	F-ΔIINVEST $_t$	-	0.2038	0.2049
	F-ΔGDP $_t$	0.6715	-	0.0434 **
	F-ΔDC $_t$	0.9648	0.0001 ***	-
5	F-ΔIINVEST $_t$	-	0.0328 **	0.0001 **
	F-ΔGDP $_t$	0.7774	-	0.0257 **
	F-ΔMC $_t$	0.0718*	0.0973*	-
6	F-ΔIINVEST $_t$	-	0.0096 ***	0.0001 ***
	F-ΔGDP $_t$	0.9101	-	0.0440 **
	F-ΔVT $_t$	0.6555	0.1633	-
7	F-ΔIINVEST $_t$	-	0.0093 ***	0.0017 ***
	F-ΔGDP $_t$	0.5066	-	0.0501*
	F-ΔTR $_t$	0.5801	0.0192 **	-

Note:
1) *, ** and *** denotes p-value Wald/ F-test rejection of Granger non-causality at the 10%, 5% and 1% levels respectively.
2) Time dummies and intercept are included in the estimation but are not reported.
3) Financial Sector in the last column represents the respective financial variable used in the PVAR.

In Table 4, we employed a four-variable difference PVAR model that combines together GDP, the aggregated financial assets of institutional investors, banking sector, and various stock market indicators interchangeably. There is evidence of institutional investment spurring economic growth in most of the frameworks with the *slight* exception of model 10 (the TR-framework). Furthermore, there is no evidence of reverse causality from GDP to institutional investors, which is consistent with our earlier findings.

Table 4: Granger Causality Test (Wald Test) for OECD countries with GDP, Institutional Investors, Banks and Stock Market

Model	Effect (→) Cause (↓)	ΔIINVEST $_t$	ΔGDP $_t$	ΔDC $_t$	ΔSTOCK $_t$
8	F-ΔIINVEST $_t$	-	0.0537 *	0.3668	0.0001 ***
	F-ΔGDP $_t$	0.6626	-	0.0250 **	0.0010 ***
	F-ΔDC $_t$	0.4712	0.0006 ***	-	0.1275
	F-ΔMC $_t$	0.0244 **	0.2029	0.2329	-
9	F-ΔIINVEST $_t$	-	0.0448 **	0.3969	0.0001 ***
	F-ΔGDP $_t$	0.5888	-	0.0512 *	0.0640 *
	F-ΔDC $_t$	0.8820	0.0001 ***	-	0.6196
	F-ΔVT $_t$	0.4758	0.1449	0.2832	-
10	F-ΔIINVEST $_t$	-	0.1043	0.3614	0.0160 **
	F-ΔGDP $_t$	0.4941	-	0.0375 **	0.0606 *
	F-ΔDC $_t$	0.9473	0.0001 ***	-	0.4006
	F-ΔTR $_t$	0.5530	0.1218	0.7575	-

Note:
1) *, ** and *** denotes p-value Wald/ F-test rejection of Granger non-causality at the 10%, 5% and 1% levels respectively.
2) Time dummies and intercept are included in the estimation but are not reported.
3) Stock $_t$ in the last column represents the respective stock market variable used in the PVAR.

We next examined the dynamics of institutional investor participation in the development of the financial sectors. We found that the activities of institutional investor participation lead to the growth of securities market as indicated by the significance of *all* the stock market variables. More specifically, institutional investment enhances the growth in stock market capitalization, value traded and turnover; and it is more significant effect on the former two indicators. Again no feedback effect was found with the exception of model 8 (market capitalization, MC framework). We also find that there seems to be no causal effect between institutional investors and the banking sector.

4.3 Institutional Investors (Disaggregated) and Financial Sector Development

The previous estimations have examined the impact of institutional investors at the aggregate level. We extend this analysis to examine the disaggregated impact of pension funds, insurance and investment companies on financial sector development

and economic growth. Studies in this area have focused on the impact of 'contractual savings' institutions of pension funds and life insurance companies while completely omitting the analysis on investment companies. Impavido et. al. (2003) employed a multivariate panel GMM method in examining the relationship between contractual savings institutions with banking and securities markets respectively. They hypothesized that the '*captive*' nature of contractual institutions would lengthen the duration of investments and liabilities while investment companies, especially open-end investment companies, generally have a shorter-term outlook. According to them, 'contractual savings institutions have a natural advantage over open-ended investment companies in financing long-term investment projects and their investment strategies will be more biased towards long-term bonds and the equity markets'(Impavido et. al, 2003). Gooptu (1993) also acknowledges that in contrast to investment companies, who switch rapidly in search of short-run returns, pension funds and life insurance companies could be taken as a risk-adverse group interested in participating in long-term investment. However the rapid growth of investment companies coupled with the 'open-endedness' characteristics of some contractual savings institutions warrants a disaggregated study of institutional investors[16].

A disaggregated empirical study was undertaken by Catalan et. al. (2000)[17] for a group of developed and developing countries. Using bi-variate VAR, they examined the interaction of pension funds, life insurance and non-life insurance companies with two securities market indicators: market capitalization and value traded. Whilst confirming the direction of causality from contractual savings institutions to

[16] According to Impavido et. al. (2003), 'although open pension funds (as opposed to closed pension funds, which are employer-sponsored plans) operate like open-end investment companies, their funds are more stable because they are captive to the industry as a whole. Hence, open pension funds are less exposed to systemic risks than are open-end investment companies.'

[17] A limitation of this study is the focus on the analysis of impact of contractual savings institutions on securities market only.

promoting the development of market capitalization as opposed to value traded[18], a key finding of their paper is the stronger causality impact of this activity in developing countries. For example, they found that in the USA, there is no evidence of either uni-directional or bi-directional causality between contractual savings institutions and stock markets. They attributed this finding to the *dilution of the illiquidity effect* of contractual savings institutions in countries with well developed financial markets (Catalan et. al., 2000).

As compared to our study on aggregated institutional investors, the results of the disaggregated study in Table A1 in the appendix suggest that this impact of institutional investors on financial sector development is driven mainly by the activities of the investment company activities. While Impavido et. al. (2003) found that contractual savings institutions have a *positive* impact on stock market depth (market capitalization) and no significant impact on liquidity (value traded), we found that at a the disaggregated level, both pension funds and insurance companies have significant impact on value traded and turnover ratio respectively. Individually, both pension funds and insurance companies *do not* have significant impact on market capitalization, but we do find evidence of Granger causality from investment companies to market capitalization. This result is indeed contrary to the findings of Impavido et. al. (2003). On a more conciliatory finding, Holzmann (1997) found that pension funds increases *both* the liquidity and market capitalization for the Argentinean economy.

[18] Impavido and Musalem (2000) accepted the direction of causality from contractual savings to capital markets. Impavido et. al. (2003) further confirms this, while finding that this impact is (a) 'non linear' in countries with a higher degree of transparency, (b) robust to the overall level of development, education, demographic structure and legal environment, and (c) heterogeneous among countries that have a market based financial system, mandatory pension contributions and lower international securities transactions.

Our seemingly contradictory evidence that contractual savings institutions lead to liquidity (value traded) and efficiency (turnover ratio) dislodges the popular notion that these contractual savings institutions, especially pension funds, follow adherently to the 'buy and hold' strategy. One could reasonably argue that this higher turnover of equities provides scant evidence either of short-terminism on the part of these contractual savings institutions or performance mandate increasingly focused on quarterly reporting. Furthermore the growing amount of funds channelled from 'contractual savings institutions' to both internally established and externally managed investment companies helps explain the importance of these investment companies in the development of the stock market. In general, the results suggest that the need for liquidity is the overriding factor not only for investment companies, but increasingly also for both pension funds and insurance companies.

On the other hand, the result in Table A1 shows sufficient evidence of feedback from stock market development to both pension funds and insurance companies. More specifically, a large and liquid stock market Granger causes pension funds. This is because "the implementation of some active and sophisticated financial strategies require very frequent trading and given the large volume of funds managed by pension funds, the price volatility implied by these strategies would be too high if the stock market is not liquid enough" (Catalan et. al., 2000).

4.4 Institutional Investors (Disaggregated) and Economic Growth

The result of the impact of institutional investors on economic growth is given in Table A2 in the appendix. In our PVAR study, we find pension fund, insurance companies and investment companies Granger causes economic growth.

While economic growth and pension funds nexus has been extensively developed, that of the insurance firms and especially for investment companies is a

fairly recent development and the very focus of this study. Outrevillle (1990, 1996) pioneered the examination of the relationship between insurance development and economic growth for developing countries. His findings indicated that both non-life (Outrevillle, 1990) and life (Outrevillle, 1996) insurance companies Granger causes economic growth. Ward and Zurbruegg (2000) extended Outreville's study by employing a time series vector error correction model (VECM) for nine OECD countries. They found no causality in either direction especially in US and UK, which is mainly attributed to the high measures of insurance density in these countries. According to them, the importance of insurance to economic growth is not necessarily in its levels of activity, rather its significance is derived from the rate of structural change in an economy that results from an increase in level of insurance provision.

In our PVAR analysis, we found that on aggregate, insurance companies in OECD countries Granger causes economic growth. With regards to the investment companies and economic growth nexus, to our knowledge, this study is the first attempt in confirming causality from investment companies to economic growth in a panel framework. Meanwhile, the feedback impact from institutional investors to economic growth is only apparent for investment companies, thereby suggesting a dynamic interaction between economic growth and the growth of investment companies.

5. Conclusion

The phenomenal growth of institutional investor has lead to the growing ownership of the financial sector by institutional investors. We have found collectively that these institutional investors have enhanced the growth of the stock markets at the expense of the loans advancements and deposit taking function of the banking sector. Overall the Granger causality in the growth of institutional investment

to the development of the financial sector has spilled over to economic growth. Similar causality issues are examined for each segment of institutional investors: pension funds, insurance companies, and investment companies. As hypothesized, causality varies along these different types of institutional investors. We found the development of the stock market, in particular market capitalization Granger causes the development of contractual savings institutions that consist of pension funds and insurance companies. While this reverse causality finding is contrary to studies done at the developing and OECD countries, we believe the maturity and large coverage of these contractual savings institutions dilutes the impact in deepening the stock market. However, we do find evidence that these contractual savings institutions do lead to various aspects of stock market liquidity. In addition, the results indicate that banking sector development does help pension fund growth, reflecting its risk-adverse nature in portfolio investment. Another key finding of this study is the significant role of investment companies in Granger causing both banking and stock market development, with no evidence of reverse causality. Studies at the individual country level which take into consideration of country specific factors like cultural, historical, legal and developmental would add to the richness of our results and could provide interesting insights on the impact of institutional investors on industrial and economic growth.

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Appendix

Table A1: Tri-variable PVAR model of Granger Causality Test (Wald Test) for OECD countries with Institutional Investors (Pension, Insurance and Investment), Banks and Stock Market Capitalization

Model	Effect (→) Cause (↓)	**ΔIINVEST $_t$ (various)**	**Δ MC $_t$**	**ΔDC $_t$**
11	**F-IINVEST $_t$ (Pen)**	-	0.1677	0.9653
	F-ΔMC $_t$	0.0119 **	-	0.9260
	F-ΔDC $_t$	0.0001 ***	0.0050 ***	-
12	**F-ΔIINVEST $_t$ (Ins)**	-	0.2032	0.9996
	F-ΔMC $_t$	0.0774 *	-	0.0776 *
	F-ΔDC $_t$	0.8934	0.2584	-
13	**F-ΔIINVEST $_t$ (Invt)**	-	0.0161 **	0.0487 **
	F-ΔMC $_t$	0.9804	-	0.1522
	F-ΔDC $_t$	0.2470	0.1367	-
		ΔIINVEST $_t$ (various)	**Δ VT $_t$**	**ΔDC $_t$**
14	**F-ΔIINVEST $_t$ (Pen)**	-	0.0963 *	0.8957
	F-ΔVT $_t$	0.0377 **	-	0.9147
	F-ΔDC $_t$	0.0402 **	0.1067	-
15	**F-ΔIINVEST $_t$ (Ins)**	-	0.1202	0.9921
	F-ΔVT $_t$	0.2968	-	0.0435 **
	F-ΔDC $_t$	0.6975	0.7416	-
16	**F-ΔIINVEST $_t$ (Invt)**	-	0.0068 ***	0.0503 *
	F-ΔVT $_t$	0.6199	-	0.0919 *
	F-ΔDC $_t$	0.2120	0.5128	-
		ΔIINVEST $_t$ (various)	**Δ TR $_t$**	**ΔDC $_t$**
17	**F-ΔIINVEST $_t$ (Pen)**	-	0.1237	0.7546
	F-ΔTR $_t$	0.4867	-	0.7116
	F-ΔDC $_t$	0.0991 *	0.3718	-
18	**F-ΔIINVEST $_t$ (Ins)**	-	0.0072 ***	0.9773
	F-ΔTR $_t$	0.2681	-	0.5622
	F-ΔDC $_t$	0.8112	0.5242	-
19	**F-ΔIINVEST $_t$ (Invt)**	-	0.0076 ***	0.0730 *
	F-ΔTR $_t$	0.4213	-	0.5133
	F-ΔDC $_t$	0.2577	0.3846	-

Note:

1) *, ** and *** denotes p-value Wald/ F-test rejection of Granger non-causality at the 10%, 5% and 1% levels respectively.
2) Time dummies and intercept are included in the estimation but are not reported.
3) IInvest $_t$ represents the institutional investors of pension funds, insurance companies and investment companies respectively used in the estimation.

Table A2: Tri-variate PVAR model of Granger Causality Test (Wald Test) for OECD countries with GDP, Individual Institutional Investors (Pension, Insurance and Investment) and Financial Sector indicators

Model	Effect (→) Cause (↓)	**ΔIINVEST $_t$ (various)**	**Δ GDP $_t$**	**ΔDC $_t$**
20	**ΔIINVEST $_t$ (Pen)**	-	0.0001 ***	0.5867
	F-ΔGDP $_t$	0.3550	-	0.7237
	F-ΔDC $_t$	0.0276 *	0.0666 *	-
21	**F-ΔIINVEST $_t$ (Ins)**	-	0.0596 *	0.7446
	F-ΔGDP $_t$	0.5277	-	0.2204
	F-ΔDC $_t$	0.8465	0.0002 ***	-
22	**ΔIINVEST $_t$ (Invt)**	-	0.0685 *	0.5236
	F-ΔGDP $_t$	0.0765 *	-	0.2758
	F-ΔDC $_t$	0.2287	0.0204 **	-
		ΔIINVEST $_t$ (various)	**Δ GDP $_t$**	**ΔMC $_t$**
23	**ΔIINVEST $_t$ (Pen)**	-	0.0001 ***	0.4283
	F-ΔGDP $_t$	0.0002 ***	-	0.1192
	F-ΔMC $_t$	0.0020 ***	0.0077 ***	-
24	**F-ΔIINVEST $_t$ (Ins)**	-	0.0978 *	0.1897
	F-ΔGDP $_t$	0.5857	-	0.0010 ***
	F-ΔMC $_t$	0.0915*	0.0791 *	-
25	**ΔIINVEST $_t$ (Invt)**	-	0.0066 ***	0.0303 **
	F-ΔGDP $_t$	0.1040	-	0.0400 **
	F-ΔMC $_t$	0.9998	0.1318	-
		ΔIINVEST $_t$ (various)	**Δ GDP $_t$**	**ΔVT $_t$**
26	**ΔIINVEST $_t$ (Pen)**	-	0.0001 ***	0.2183
	F-ΔGDP $_t$	0.7299	-	0.0183 **
	F-ΔVT $_t$	0.0918*	0.6268	-
27	**F-ΔIINVEST $_t$ (Ins)**	-	0.0181 **	0.2018
	F-ΔGDP $_t$	0.4281	-	0.0838 *
	F-ΔVT $_t$	0.3277	0.0972 *	-
28	**ΔIINVEST $_t$ (Invt)**	-	0.001 ***	0.0010 ***
	F-ΔGDP $_t$	0.0978 *	-	0.0001 ***
	F-ΔVT $_t$	0.5069	0.4244	-
		ΔIINVEST $_t$ (various)	**Δ GDP $_t$**	**ΔTR $_t$**
29	**ΔIINVEST $_t$ (Pen)**	-	0.0001 ***	0.1389
	F-ΔGDP $_t$	0.7013	-	0.0549
	F-ΔTR $_t$	0.7452	0.0553 *	-
30	**F-ΔIINVEST $_t$ (Ins)**	-	0.07878 *	0.0193 **
	F-ΔGDP $_t$	0.5924	-	0.1326
	F-ΔTR $_t$	0.3656	0.0103 **	-
31	**ΔIINVEST $_t$ (Invt)**	-	0.0055 ***	0.0927 *
	F-ΔGDP $_t$	0.0310 **	-	0.0009 ***
	F-ΔTR $_t$	0.3376	0.0696 *	-

Note:

1) *, ** and *** denotes p-value Wald/ F-test rejection of Granger non-causality at the 10%, 5% and 1% levels respectively.
2) Time dummies and intercept are included in the estimation but are not reported.
3) IInvest $_t$ represents the institutional investors of pension funds, insurance companies and investment companies respectively used in the estimation.