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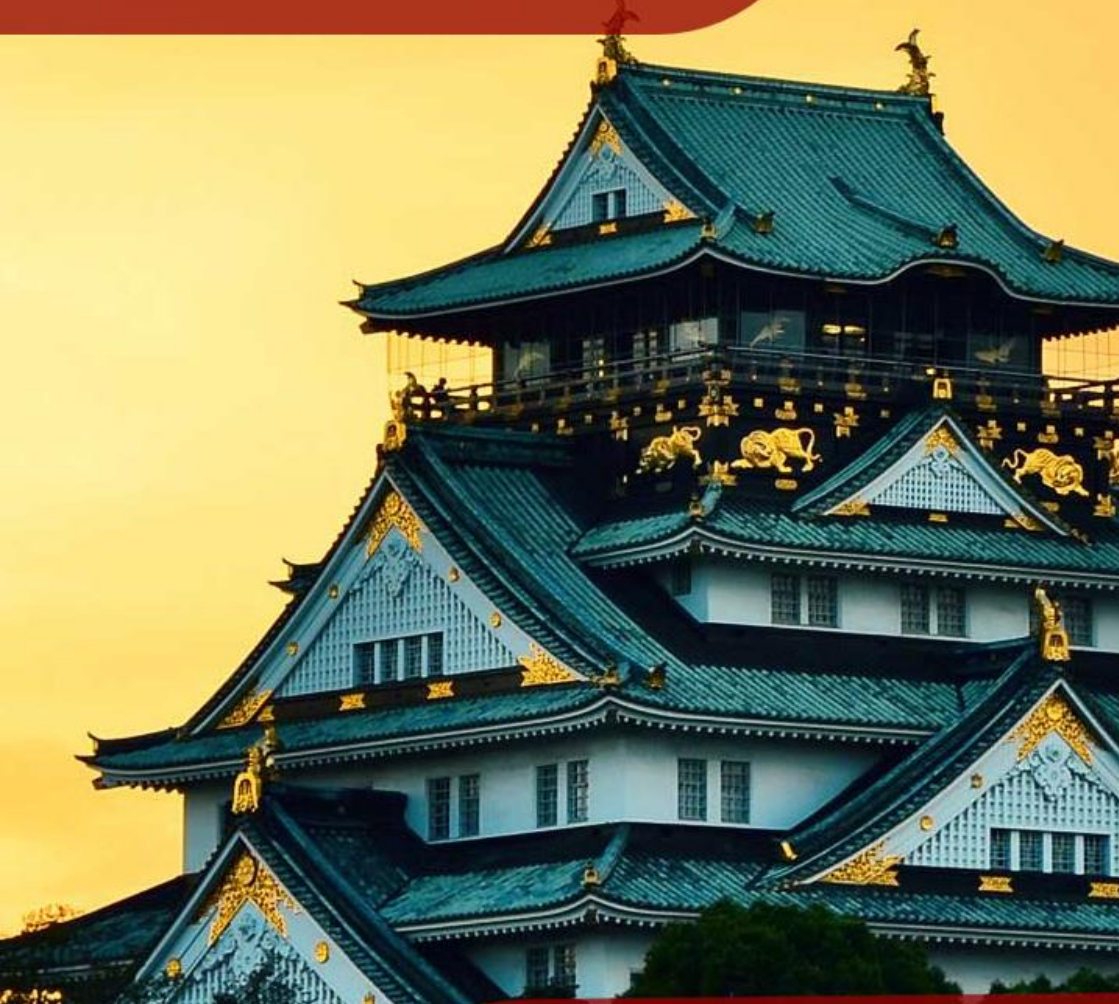

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International Conference of Akademika Nusa Internasional Association of Social Sciences and Huminities} is a platform that thrives to support the worldwide scholarly community to analyze the role played by the multidisciplinary innovations for the betterment of human societies. It also encourages academicians, practitioners, scientists, and scholars from various disciplines to come together and share their ideas about how they can make all the disciplines interact in an innovative way and to sort out the way to minimize the effect of challenges faced by the society. All the research work presented in this conference is truly exceptional, promising, and effective. These researches are designed to target the challenges that are faced by various sub-domains of the social sciences and applied sciences.

I would like to thank our honorable scientific and review committee for giving their precious time to the review process covering the papers presented in this conference. I am also highly obliged to the participants for being a part of our efforts to promote knowledge sharing and learning. We as scholars make an integral part of the leading educated class of the society that is responsible for benefitting the society with their knowledge. Let's get over all sorts of discrimination and take a look at the wider picture. Let's work together for the welfare of humanity for making the world a harmonious place to live and making it flourish in every aspect. Stay blessed.

Thank you.

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International conference on Innovative Trends in Engineering, Technology, Computer and Applied Sciences (ITETCAS)

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Applying Taguchi Method and Particle Swarm Optimization Algorithm for Reducing Real Power Loss in Distribution Networks

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Abstract. Three-phase unbalance affected system operation performance significantly, especially in increasing real power loss. Consequently, an efficient and systematical phase balancing approach was proposed in this paper. This approach is able to achieve three-phase balancing between the loads and their connected nodes for reducing real power loss. The first stage of the proposed approach is to decide the coefficients for particle swarm optimization (PSO) algorithm by the Taguchi method according to the characteristics of the target system. Next, these coefficients are used in the PSO algorithm for optimal phase balancing. This approach avoids the blind try-and-error procedure and reduces the effect of unsuitable coefficient setting. Finally, the IEEE 37-Bus test feeder was used to verify this approach. The simulation results demonstrated that it is an efficient and systematical approach for real power loss reduction in distribution networks.

Keywords— Particle Swarm Optimization (PSO), Taguchi Method, Phase Balancing, Power Loss.

INTRODUCTION

Distribution networks are located at the end of power systems, the major function of them are distribution electrical power to various types of customers. Therefore, the feeder arrangements are different dependent on the service areas and their loads. In general, the over-head and radial type feeder arrangements are employed in rural or suburban areas; however, the under-ground and open-loop feeder even more closed-loop arrangements are usually adopted in urban area. It is well known that the main components of distribution networks are feeders and transformers. Generally, the main feeders are connected from the secondary side of main transformer in distribution substation, and then the distribution transformers are connected from main feeders, laterals, and sub-laterals; finally the secondary conductors are connected to the secondary side 0f distribution transformers provide electrical power to end users. Where the main feeders are usually three-phase arrangement, but the laterals may two-phase or single-phase arrangements and this kind of asymmetrical structure is one of the factors that cause unbalanced in distribution networks. In addition to, most single-phase transformers and asymmetrical three-phase transformer banks are greatly used to provide both single-phase lighting loads and three-phase power equipment, and this condition usually makes the unbalance situation worse [1-3].

Moreover, lots of distributed energy resources, which are composed of distributed generations and storage devices are interconnected into distribution networks in recent years [4-6]; therefore, the unbalanced condition maybe increased or decreased related to their connection types. However, these unbalance factors will cause the voltage and current imbalanced in distribution networks, and then lead to de-rating operation of motors, malfunction of LCO power relay, and increasing power loss. Consequently, T. H. Chen et. al [7] proposed genetic algorithm for optimal phase arrangement of distribution transformers connected to a primary feeder for distribution system unbalance improvement and loss reduction; besides, C.-H. Lin et. al [8-9] adopted expert system and heuristic rule based phase balancing approach, which considering customer load patterns in distribution systems; in additional to, M.-Y. Huang et. al [10] using immune algorithm for three-phase balancing of distribution feeders. Moreover, W. T. Huang et. al [11]proposed genetic algorithm for load balancing of modern distribution networks.

The related researches mentioned above have their advantages and weakness, but the only purpose of them is to find the optimal phase arrangement between the connection points at feeder end and primary side of distribution transformer. It is a complex combination problem, some try-and-error approaches have been adopted for deciding essential coefficients in artificial intelligent methods; however, they are not efficient. Consequently, in this paper, the Taguchi method is used to decide the learning factors of PSO [12-13] for avoiding inefficient try-and-error process. This paper is organized by four sections. Section 1 presents the introduction. Section 2 describes the optimal coefficients design the proposed PSO by Taguchi method. Section 3 demonstrates and discusses the simulation results. Section 4 concludes the paper.

THE OPTIMAL COEFFICIENTS DESIGN OF THE PROPOSED PSO

In this section the PSO algorithm and Taguchi method for real power loss reduction by improving three-phase voltage and current unbalanced will be described detailed as follows.

PSO Algorithm

PSO was first introduced by J. Kennedy and R.C. Eberhart in 1995 [12-13]. It is a population-based optimal search technique ascribed to the social behavior of bird flocking. PSO simulates the population behavior, which combines the cognition-only model and the social-only model, as shown in figure 1. The cognition-only model searches for the individual

best solutions as the local best (pbest) and changes particle position and velocity to move in a multi-dimensional space until the position does not change or the computational limits are reached. In the social-only model, the pbest and global best (gbest) are compared to update the gbest and change particle position and velocity. The combination of pbest and gbest in PSO allows the particle to adjust rapidly and correctly that results in fast convergence. In figure 1, kmax is the maximum iteration, n is the particle number, is the velocity of particle n at the kth iteration, is the kth position of particle n, c1 and c2 are learning factors, rand1 and rand2 are random numbers between 0 and 1, is the best value of particle n at the kth iteration, and is the global best value at the kth iteration. w, wmax, and wmin are acceleration coefficients, maximum weighting values, and minimum weighting values, respectively. The solution flow chart is shown in figure 2.

Taguchi Method

Taguchi method, which is developed by Genichi Taguchi, to improve the quality of manufactured goods. It is also called statistical method or robust design method, and it is applied to engineering, biotechnology, marketing and advertising recently [14]. The experimental flow chart of Taguchi method is shown in figure 3. In this paper, it is the first to apply the Taguchi method in coefficient decision in PSO for the optimization of three-phase balancing in distribution networks in order to improve voltage and current imbalance; furthermore, reducing power loss.

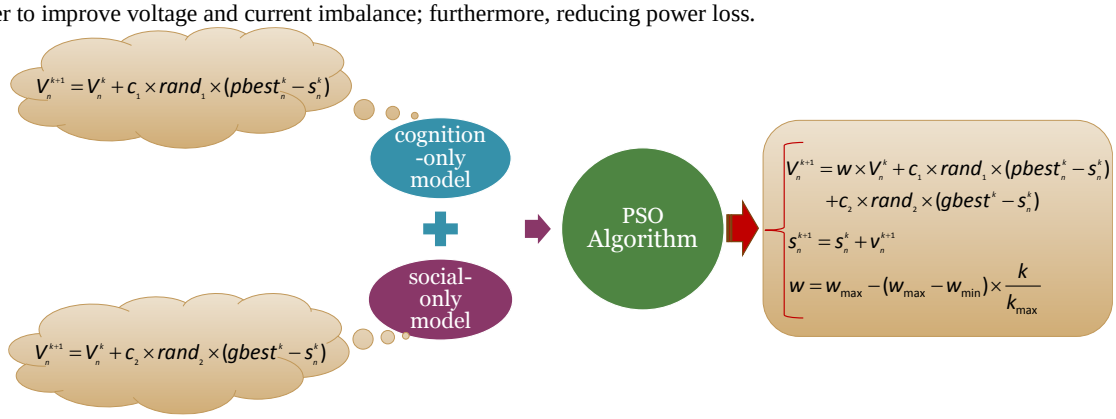


Figure 1: Schematic diagram of PSO algorithm.

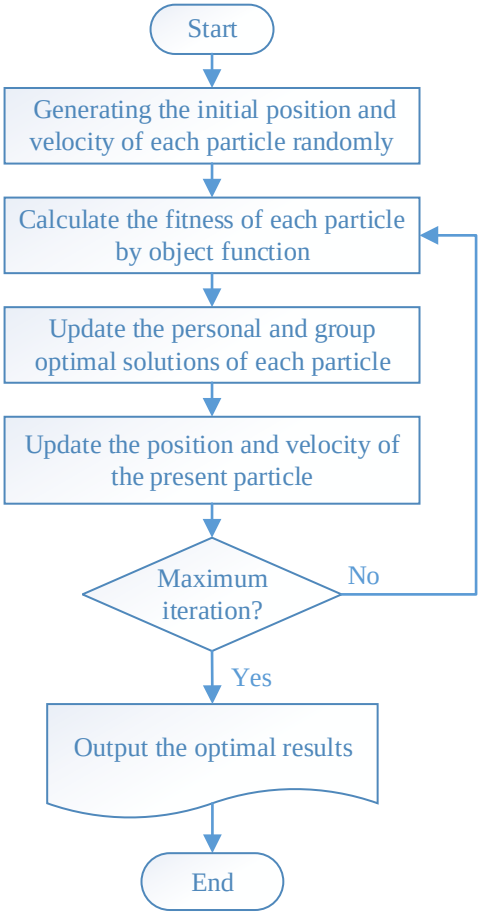


Figure 2: Solution flow chart of PSO algorithm.

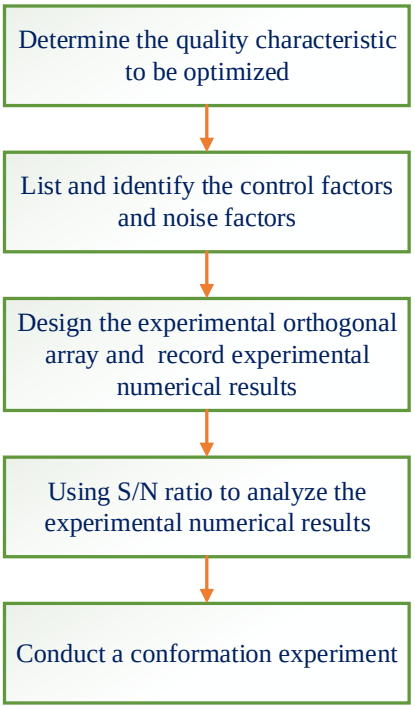


Figure 3: Experimental flow chart of Taguchi method.

Coefficients Design

Design of Quality Characteristic

The first step of Taguchi method is to determine the quality characteristic to be optimized. It is similar to the general setting of object function in optimal problem. In this paper, the purpose is to minimize real power loss; therefore, the smaller-better response is used in Taguchi method.

List and Identify Control and Noise Factors

The second step is to list the major influence factors. After detailed analyzing of PSO algorithm, it is concluded that the dominate factors affecting the convergence result are five coefficients, i.e. particle number, iteration number, weighting value, individual learning factor, and global learning factor. Accordingly, these five coefficients are selected as the control factors, and four levels of each independent variable and its corresponding value are set in table 1.

Table 1. Layout of L_4 orthogonal array for PSO.

Factor	*Independent Variable*	*Level 1*	*Level 2*	*Level 3*	*Level 4*
A	particle number	20	30	100	200
B	iteration number	100	200	500	1000
C	weighting value	0.2	0.4	0.6	0.9
D	individual learning factor	1.494	2	2.05	2.4
E	global learning factor	1.494	2	2.05	2.4

Design and Record the Experimental Orthogonal Array

Based on table 1, the third step is to choose the L_{16} orthogonal array to conduct experiment, and experimental numerical results are shown in table 2.

Table 2. Layout of L_{16} orthogonal array of PSO and experimental results.

Experiment#	**A**	**B**	**C**	**D**	**E**	**Power Loss (kW)**	**S/N Ratio**
1	1	1	1	1	1	156.216	-239.18
2	1	2	2	2	2	153.633	-238.84
3	1	3	3	3	3	151.863	-238.61
4	1	4	4	4	4	149.313	-238.27
5	2	1	2	3	4	151.899	-238.61
6	2	2	1	4	3	151.410	-238.55
7	2	3	4	1	2	150.416	-238.42
8	2	4	3	2	1	150.296	-238.40
9	3	1	3	4	2	149.585	-238.31
10	3	2	4	3	1	150.048	-238.37
11	3	3	1	2	4	149.881	-238.35
12	3	4	2	1	3	149.792	-238.34
13	4	1	4	2	3	149.250	-238.26
14	4	2	3	1	4	150.584	-238.44
15	4	3	2	4	1	149.091	-238.26
16	4	4	1	3	2	149.448	-238.29

Numerical Results Analysis by S/N Ratio

The forth step is using the smaller-better response formula to calculate signal-to-noise ratio by (1). Smaller values of the signal-to-noise ratio (S/N) identify the control factors are better, and the numerical results are shown in table 2.

$$\frac{S}{N} = -10\log\frac{\sum_{i=1}^{n} P_i^2}{n} = -10\log(P^2 + S_n^2) \qquad (1)$$

Where S represents the standard error of experimental result; N is the measured value of experimental result, and P is the experimental result.

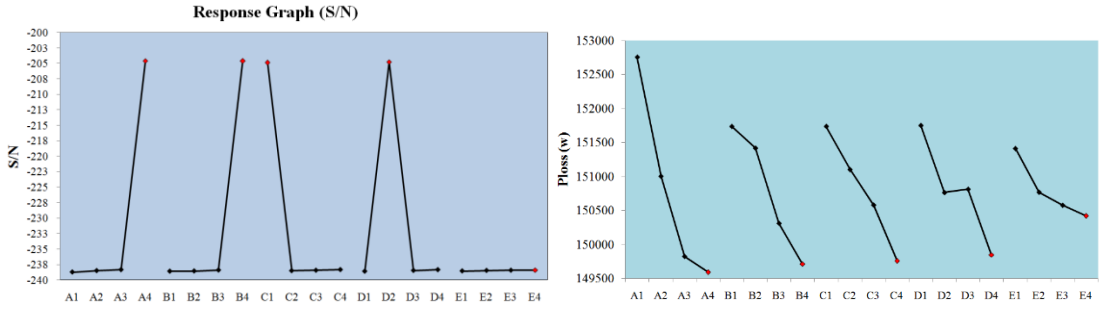
After analyzing the numerical results of table 2, the factor response table of S/N ratio and power loss for optimal coefficient design of PSO are listed in table 3 and table 4, respectively. In which level 1-4 are the average of S/N ratio correspond to the control factor in each row. E1-2 is the effect of S/N ratio of the factor that vary from level 1 to level 2, and E2-3 and E3-4 are deduced by analogy. The "Range" represents the variation scale of each factor from minimum to maximum, and the "Rank" is derived by sorting the "Range", the larger the value of Range represents the significant it is. The "Significant" is called half rule, its main purpose is to quick screen three vital important factors. For clearly observing which control factor affecting the level range most, the factor response figure of S/N ration and power loss are depicted in figure 4(a) and 4(b), respectively. It is clear that A4, B4, C1, and D2 are the most effect factors among all the control factors. Furthermore, A4, B4, and D2 are the most effect factors for S/N ratio by quick screening using half rule.

Table 3. Factor response table of S/N ratio for optimal coefficient design of PSO.

	A	B	C	D	E
Level 1	-238.7293	-238.595	-204.894	-238.597	-238.55
Level 2	-238.501	-238.555	-238.513	-204.775	-238.47
Level 3	-238.344	-238.409	-238.449	-238.47	-238.44
Level 4	-204.612	-204.628	-238.335	-238.35	-238.42
E1-2	0.228	0.03955	-33.6188	33.8226	0.08
E2-3	0.1566	0.14625	0.06815	-33.6954	0.03
E3-4	33.7323	33.7808	0.10972	0.12	0.02
Range	34.1169	33.9666	33.618	33.8226	0.13
Rank	1	2	4	3	5
Significant	Yes	Yes	No	Yes	No

Table 4. Factor response table of power loss for optimal coefficient design of PSO.

	A	B	C	D	E
Level 1	152756	151737	151739	151752	151413
Level 2	151005	151419	151104	150765	150770
Level 3	149826	150313	150582	150814	150579
Level 4	149593	149712	149756	149850	150419
E1-2	-1750	-318	-634	-986	-642
E2-3	-1179	-1106	-522	49	-191
E3-4	-233	-600	0-825	-964	-159
Range	3162	2025.397	1982	1902	993
Rank	1	2	3	4	5
Significant	Yes	Yes	Yes	No	No



(a) S/N ratio (b) power loss

Figure 4: Factor response figures of for optimal coefficient design of PSO.

Conduct a Conformation Experiment

From figure 3 and 4, the most effect factors on power loss are A4, B4, and C4; however, these three factors are different compared to the S/N ratio. Therefore, it is necessary to analyze their significant to the results by classify control factors, as shown in table 5. The control factors can be classified into three types, the first type is the most effect factor on S/N ratio; the second type is the adjust factor on power loss, and the third type is the non-effect factor on two types mentioned above. The optimal coefficient combinations of PSO are A4, B4, C4, D2, and E4 according to the priority order in table 5.

Table 5. Classification of control factors for optimal coefficients of PSO.

Classification	Effect on S/N ratio?	Effect on power loss?	Control factors	Results
1	Yes	Yes/No	A、B、D	effect on S/Ratio
2	No	Yes	C	reduce power loss
3	No	No	E	fewer effect

SIMULATION AND DISCUSSION OF A SAMPLE SYSTEM

In this section, the IEEE 37-Bus test system are employed as sample system to verify the advantage of the proposed approach, which is composed Taguchi method and PSO algorithm for optimal three-phase balancing in distribution networks. The coefficients of PSO are obtained by Taguchi method in subsection 2.4.5, and the power flow is performed by OpenDSS[10].

Description of the Sample System and Solution Technique

The IEEE 37-Bus is shown in figure 5, there are 24 asymmetrical loads excluded symmetrical components for rearranging. According to PSO algorithm, each load bus has its connection scheme, which is corresponding to its particle code. Figure 6 shows the three-phase connection types corresponding to their particle codes, and each code represented the individual phase arrangements at each bus. In this paper, the proposed PSO algorithm is applied to search for the optimal connection schemes of every loads by the objective function, as shown in (2). The simulation results are discussed as follows.

$$\min f = \sum_{i=1}^{L} \sum_{p\in a,b,c} \left| I_j^p \right|^2 R_j^p , \qquad (2)$$

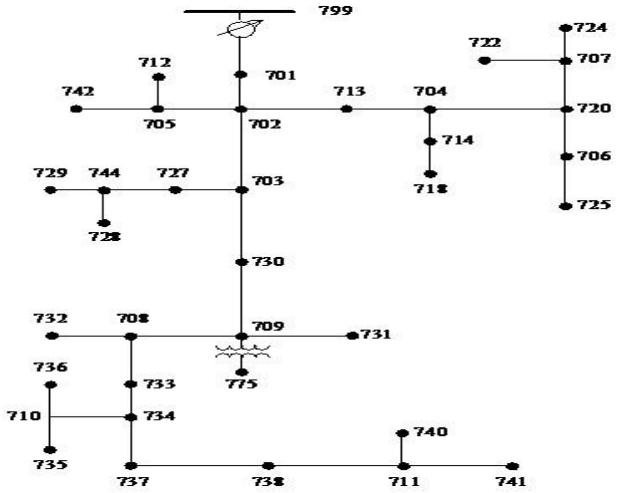


Figure 5: *IEEE 37-Bus Test System.*

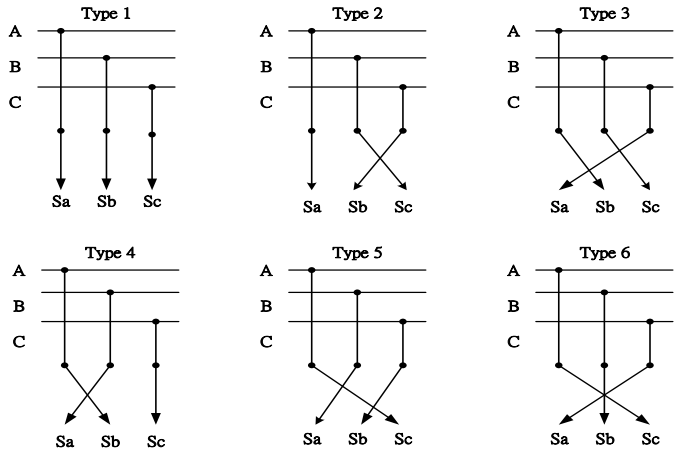


Figure 6: Six connection types between the feeder side and load side.

Simulation Results

Two scenarios are used to verify the proposed approach in this paper, the first scenario is the experienced try-and-error method for choosing the coefficients of PSO, and the second scenario is applying Taguchi method for deciding the coefficients of PSO. These two scenarios are executed by the proposed flow chart as shown in figure 7. The simulation results are show in figure 8, the power loss of the experienced try-and error method is greater than that of the Taguchi method, it is surely that applying Taguchi method for determining the coefficients of PSO is efficient and feasible for solving the optimal three-phase balancing problem in distribution networks, and furthermore reducing power loss and increasing operation performance.

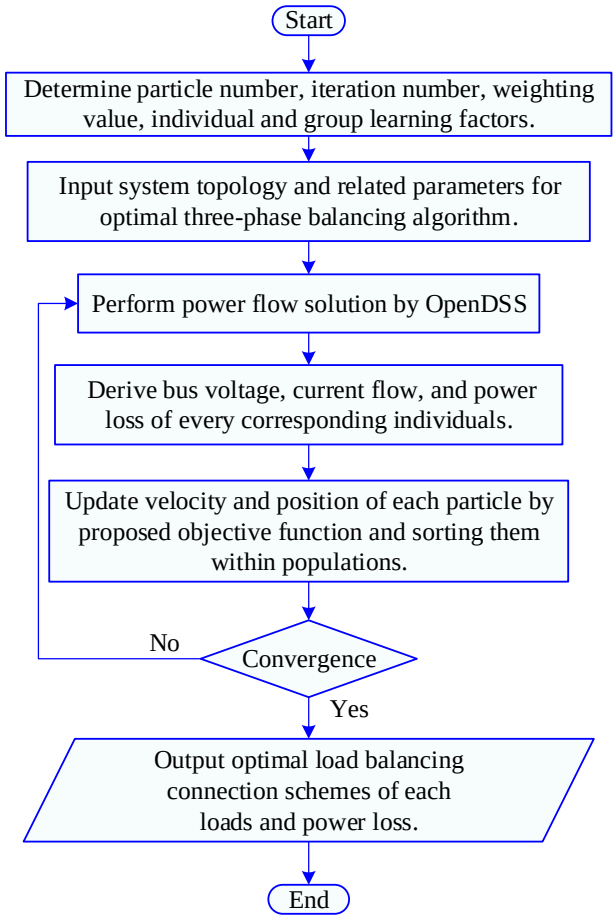


Figure 7: Flow Chart of the Proposed Approach.

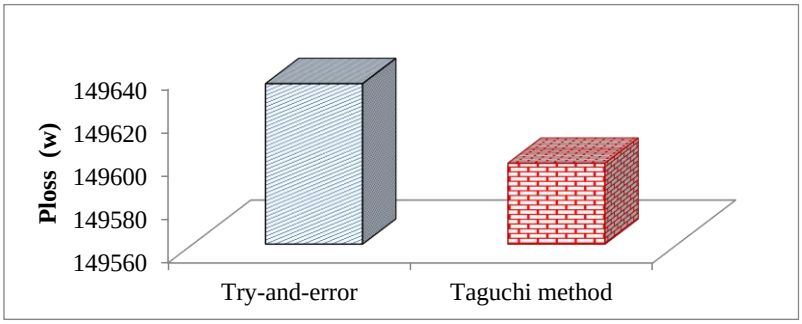


Figure 8: Simulation result of real power loss.

CONCLUSIONS

In this paper, a hybrid approach is proposed for optimal three-phase balancing in distribution networks. The Taguchi method is used to decide the essential coefficients of PSO, it is efficient and feasible instead of try-and-error method, and then the proposed PSO algorithm is applied to solve for the optimal three-phase balancing problem by rearranging the connection schemes at each load points. The IEEE 37-Bus test system is used to verify the feasibility of the proposed approach, and the numerical results demonstrate that the real power loss is reduced.

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REFERENCES

A. Kulmala, S. Repo and P. Järventausta, "Increasing penetration of distributed generation in existing distribution networks using coordinated voltage control," International Journal of Distributed Energy Resourcesy, vol. 5, no. 3, 2009.

C.-H. Lin, C.-S. Chen, H.-J. Chuang, and C.-Y. Ho, "Heuristic rulebased phase balancing of distribution systems by considering customer load patterns", IEEE Trans. on Power Systems, vol. 20, no. 2, pp 709- 716, May 2005.

C.-H. Lin, C.-S. Chen, H.-J. Chuang, M.-Y. Huang, and C.-W. Huang, "An expert system for three-phase balancing of distribution feeders", IEEE Trans. Power Systems, vol. 23, no. 3, pp 1488-1496, August 2008.

J. Kennedy and R. C. Eberhart, "Particle swarm optimization," in: Proc. IEEE Int. Conf. on Neural Networks, Perth, Australia, vol. 4, pp. 1942-1948, 1995.

Kersting W H. Distribution System Modeling and analysis. CRC PRESS, 2002.

M.-Y. Huang, C.-S. Chen, C.-H. Lin, M.-S. Kang, H.-J. Chuang and C.- W. Huang, "Three-phase balancing of distribution feeders using immune algorithm," IET Gener. Transm. Distrib., vol. 2, no. 3, pp. 383–392, 2008.

R. C. Eberhart and J. Kennedy, "A new optimizer using particle swarm theory," in: Proc. IEEE Int. Symposium on Micro Machine and Human Science, Nagoya, Japan, pp. 39-43, 1995.

T. Ehara, "Overcoming PV Grid Issues in the Urban Areas," International Energy Agency, 2009, IEA-PVPS Task 10-06, 2009.

T. H. Chen and J. T. Cherng, "Optimal Phase Arrangement of Distribution Transformers Connected to a Primary Feeder for System Unbalance Improvement and Loss Reduction Using a Genetic Algorithm, "Proceeding of the 21th International Conference on Power Industry Computer Applications, pp. 145-151(1999).

T. H. Chen and W. C. Yang, "Modeling and Analysis of Three-phase Four-wire Distribution Transformers with Mid-tap on the Secondary Side", International Conference on Energy Management and Power Delivery, Vol. 2, 3-5 pp. 723-727, 1998.

T. H. Chen, J. D. Chang, Y. L. Chang, "Models of Grounded Mid-tap Open-wye and Open-delta Connected Transformers for Rigorous Analysis of A Distribution System," IEE Proceedings- Generation, Transmission and Distribution, Vol. 143, No. 1, pp. 82-88, 1996.

Taguchi, G.; Elsayed, E.A.; Hsiang, T.C. Quality Engineering in Production Systems; McGraw-Hill Book Co.: New York, NY, USA, 1989; pp. 1–10.

Tuan Dang. The Energy Web: Concept and challenges to overcome to make large scale renewable and distributed energy resources a true reality. 7th IEEE International Conference on Industrial Informatics, Jun. 2009, pp. 384-389.

W. T. Huang, K. C. Yao, Y. H. Huang, C. C. Wu and C. H. Lo, "Load Balancing of Modern Distribution Networks by Genetic Algorithm," The 11th International Conference on Information Technology and Applications(ICITA2016),Sydney, Australia.

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Investıgatıon of Sıte Effect in Hatay Provınce by Usıng Seısmıc Refractıon, Masw and Remı Measurements and Mıcrotremor Studıes

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Abstract. In this study, shallow seismic surveys, including seismic refraction, Multichannel Analysis of Surface Waves (MASW), Refraction Microtremor (ReMi), Microtremor Measurements were conducted to estimate site characterization at 26 strong motion stations of AFAD in Hatay province situated in one of the seismically active region in southern Turkey. The study area is divided into two with the Amanos Mountains extending in NE-SW direction. The western part of the mountains is surrounded by the Iskenderun Bay and its east lies on a thick sediment which is known to have increased the ground motion during the previous earthquakes. Reliable site response information is required for the investigation of site effects and hazard assessment of the region. The ground conditions of Hatay region were determined from surface seismic, MASW, ReMi and Microtremor studies applied at AFAD's strong motion stations in this area. MASW and ReMi data were combined to reveal the deep (>100m) S-wave velocity profile of the underground. HVSR technique was applied, using smoothed Fourier spectra derived from long time series to determine dominant frequency values at different amplification levels. Hatay province was classified according to Vs30 based NEHRP Provisions, Eurocode-8 and TBDY-2017.

Keywords— Site Effect, Hatay, Seismic, Refraction, MASW, REMI, Microtremor

INTRODUCTION

The Hatay area, which is located in a seismically active region at the western end of the 1000-km-long border formed by Arabic and Turkish plates. The tectonic activity of the region shows a complex tectonic behavior under the influence of faults extending to the Dead Sea, Eastern Anatolia and Cyprus [1]. More than ten most disastrous earthquakes during the past century (BC 37–2015) existed in this area have indicated that local site conditions have major effects on ground shaking. It was reported that the tsunamis occurred during the1822 and 1872 earthquakes in Hatay caused the death of 20 thousand people [2]. These devastating earthquakes in the past have shown that the local ground condition is a major influence on ground amplification which can be calculated by S-wave velocity structure and microtremor studies. Few studies about site effect were performed in the Hatay region. [3] conducted a site response analysis compiling data such as density, seismic wave velocity, and soil cross-sections from previous seismic microzonation studies and acceleration data from four free-field strong-motion stations of the SERAMAR project.

They determined three different layers for the ranges 0-5m, 5-15m and 15-25m. The seismic velocities of these layers vary between 380 and 470m/s for 0-5m, 320 and 480m/s for 5-15m and 470 and 750m/s for 15-25m. [4] analyzed the microtremor data for Antakya and proposed preliminary microzonation map for Antakya province based on dominant periods ranging from 0.2 to 0.8sec and shear wave velocities of the sediments covering the area. [5] studied the relationship between ground conditions and earthquake effect in Antakya. [6] studied the seismicity of the region between Adana-Antakya-Kahramanmaraş with the parameter "b" and risk analysis. [7] tried to investigate local site effects of MATNet consisting of 55 triaxial force-balance accelerometers and capable to record explosions installed near the Hatay-K.Maras areas and to evaluate them as a part of early warning and preliminary damage estimate system. [8] conducted microtremor array exploration of shallow S-wave velocity profiles at 28 sites in Hatay and Kahramanmaraş provinces. They determined predominant frequencies from 0.8 to 10 Hz in Hatay, and the peak amplitude values more than 5 in Kahramanmaraş.

In this study seismic refraction, Multichannel Analysis of Surface Waves (MASW), refraction microtremor (ReMi) and microtremor studies were conducted at 26 strong-motion stations of AFAD located in Hatay province to investigate S-wave velocity distribution in shallow soil which is important in the design of seismic hazards. MASW and ReMi data are combined to search depth information of more than 100m considering the role of the low-velocity strata located near the surface in ensuring strong ground motion. Vs30 profile, site amplification, site classification and predominant period of the investigation area were determined.

GEOLOGY AND TECTONICS OF THE REGION

Hatay and its immediate surroundings are located to the south of the Antakya-Kahraman maraş graben, which developed under the influence of the Dead Sea and Eastern Anatolian Faults and the Cyprus Spring. The south of the graben is shaped by the Dead Sea Fault. However, Arabian and African plates move northward under the influence of convective currents in the mantle over the weakly resistant (fluid) upper asthenosphere. The slip vectors of earthquakes in the region, the fault systems, the global kinematic models based on the oceanic spread, indicate that the Arabian plate moves north-northwest to Eurasia at an average speed of 25 mm per year.

The African plate is moving northward at about 10 mm per year in relation to Eurasia [9]. Although many destructive depressions have been exposed in the historical period, there has not been an earthquake in the area for 135 years. This situation increases the risk of destructive earthquakes every day (Fig. 1). The Otokton Arabian platform rocks with the main lines of the geology of the Amanos Mountains covering the vast majority of the region; Ophiolite nappes; Neo-autoclaved

sediments covering nappes and autochthonous units are defined. The Amanos Mountains located at the southern tip of the Eastern Taurus Mountains and the Kızıldağ ophiolite massif in the vicinity of them also have an important place in the geology of the region (Fig. 2).

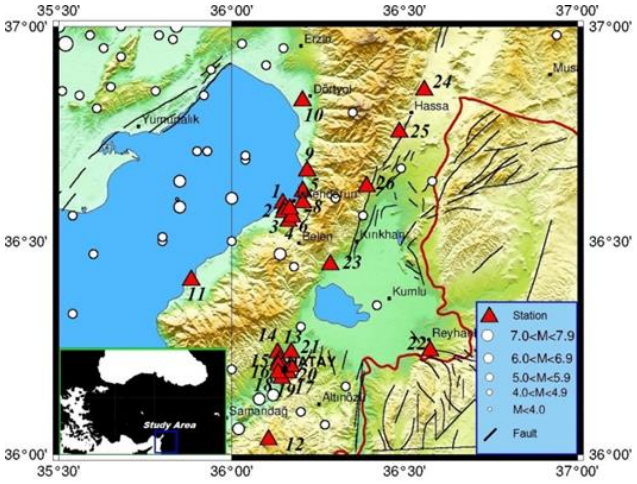


Fig. 1. Tectonics of the study area, distribution of stations and distribution of the earthquakes that have taken place in the last 10 years.

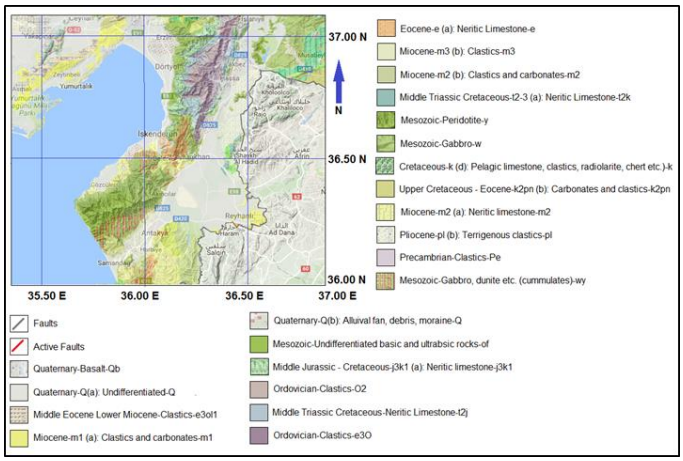
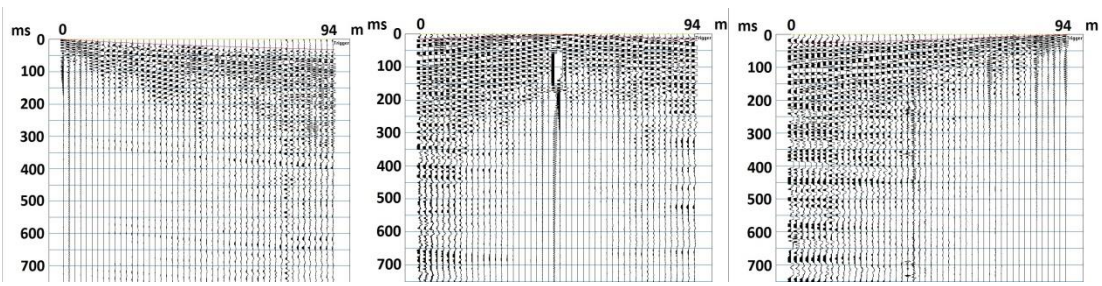


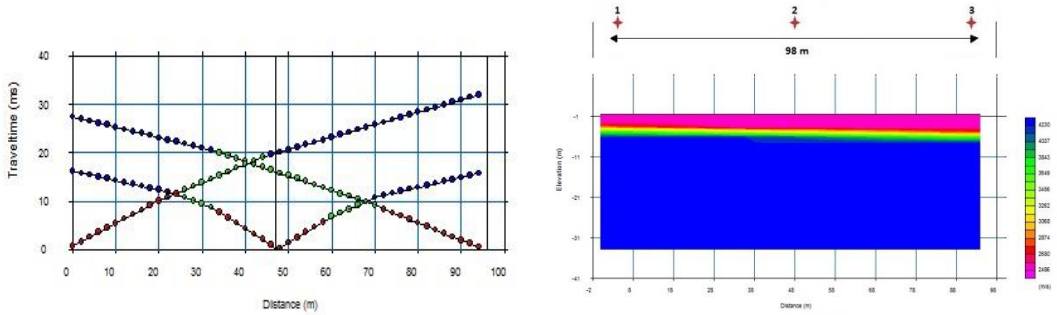
Fig. 2. The geology of the study area [10], [11].

DATA ACQUISITION AND ANALYSIS

Seismic refraction, MASW, ReMi and microtremor data were collected at AFAD's 26 strong motion stations in Hatay province, southern Turkey. Seismic refraction data were recorded for 2 sec with a sampling rate of 1msec using a 50kg weight dropper energy source equipped with a hydraulic weight lifting unit driven by an electric motor powered by a battery. 48 4.5 Hz P-wave geophones were fixed at 2m intervals in line. Data were collected from forward, midpoint and reverse shootings with 2m offsets and were transmitted to two 24-channel GEODE recording units and converted from analog to digital form. An example of shot records acquired at station 3122 coded station (#10) is demonstrated in Fig.3.



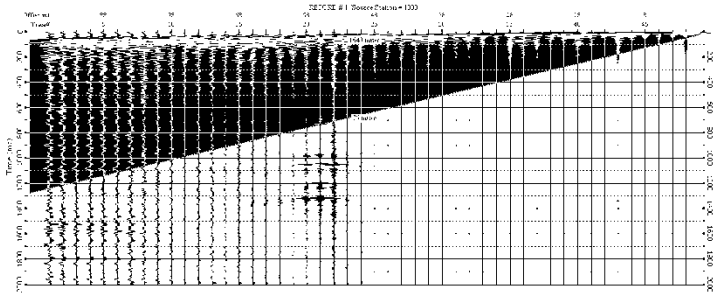
(a)



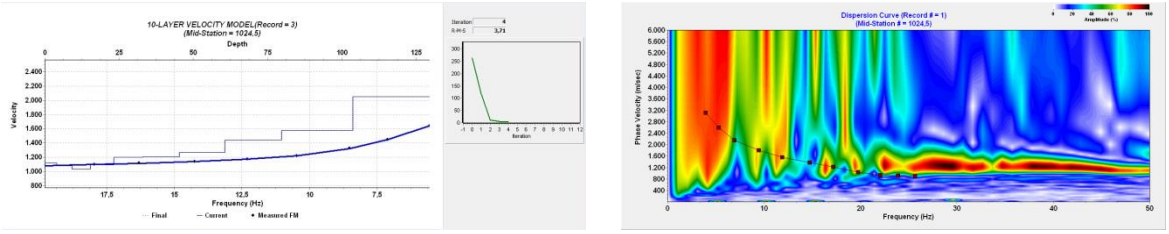
(a) (b)

Fig.3. Sample seismic refraction record taken at 3122 coded stations (#10), (a) Seismic refraction records with picked first arrival times showing in red line, (b) Actual travel time curves, (c) P-wave velocity-depth model along the profile

The shot records at each side were used in the analysis of the surface waves (MASW) to estimate the Vs profiles of the topmost 30m. It was filtered 2-4, 36-48 Hz band-pass filter to remove low and high frequency noise (Fig 4a). After that plane wave decomposition was applied to transform the data from offset time to phase velocity-against frequency domain [12], [13]. The dispersive curve related to fundamental mode of surface waves are picked from this domain. S-wave velocity as a function of depth was determined inverting the dispersion curve. For this mode, a phase velocity curve (dispersion curve) representing the variation of the phase velocity with respect to frequency is determined as shown. This dispersion curve was used to determine the S-wave velocity-depth profile of the stationary zone by the inversion method (Fig. 4b). The dispersion curve which demonstrates the variation of phase velocity with frequency for fundamental mode is shown in Fig. 4c.



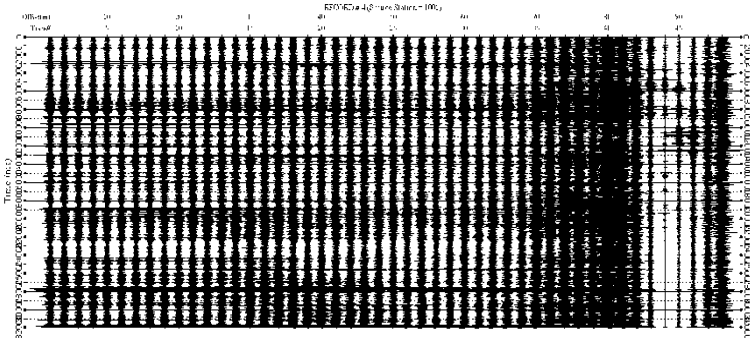
(a)



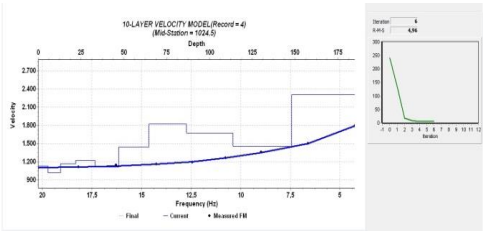
(b) (c)

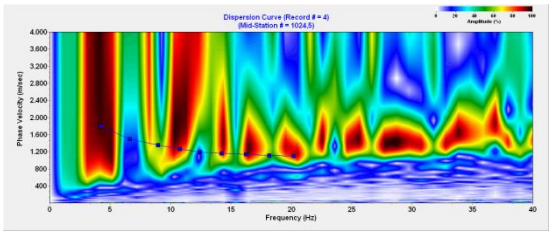
Fig.4. (a) the shot record separated from the refraction and reflected waves at 102 coded station , (b) MASW dispersion spectrum of the surface waves, (c) Vs-depth profile and modeled dispersion curve. The MASW S-wave-depth profile (blue) and the modeled dispersion curve (black).

The ReMi data were recorded for 32 sec with a sampling rate of 2msec with the same field layout using ambient noise generally coming from wind and traffic as a seismic source. 24-25 records were stacked at each ReMi setup. The Rayleigh wave dispersion picks are modeled using trial and error settings of the velocity-depth model to determine the shear wave velocity-depth profile. The time-distance data are shown in Fig. 5a. The dispersive curve related to fundamental mode of surface waves are picked from this domain. S-wave velocity as a function of depth was determined inverting the dispersion curve (Fig. 5b).This dispersion curve was used to determine the S-wave velocity-depth profile of the stationary zone by the inversion method Fig5c. The S-wave velocity-depth profile is obtained by inversion from the Rayleigh wave fundamental mode dispersion curve shown in Fig.5b.



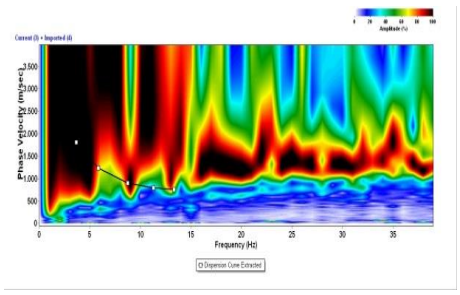
(a)

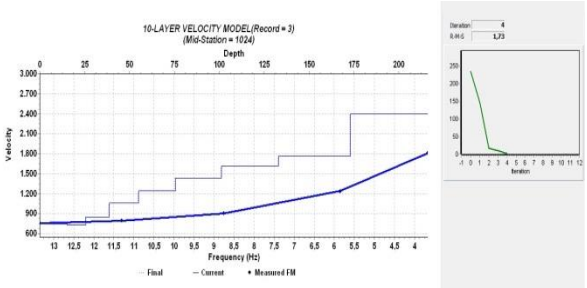




(b) (c)

Fig. 5. (a) ReMi data, x-t domain at 102 coded station,(b) the dispersion spectrum calculated by separating the plane-wave components of the surface waves present in the seismic record, (c) ReMi S-wave velocity-depth profile (blue) and modeled dispersion curve (black). The vertical axis indicates the S-wave velocity and the horizontal axis shows the frequency of dispersion curve.



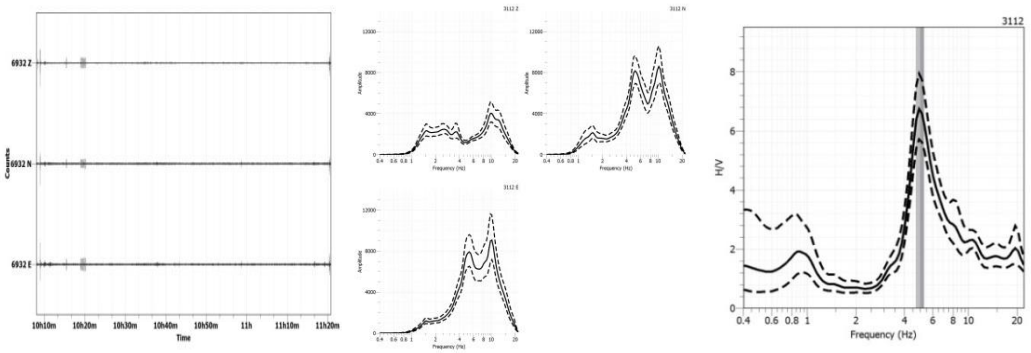


(a) (b)

Fig. 6. (a) The dispersion curve obtained as a result of MASW + REMI combined inversion; (b) S wave velocity-depth profile obtained due to the dispersion curve shown in (a)

The REMI and MASW velocity spectra were combined and hence the deeper velocities were easily observed (Figs. 6a and 6b).

Velocity based broad-band sensor (flat response between 0.03-50 Hz) has been used for ambition noise record. Whole data were acquired with the same sensor. (Fig. 7a and 7b). The evaluated spectra of the 3 components microtremor data are given in Fig. 7c. H/V amplitude spectrum of dominant frequency and amplification of 3122 coded station (# 10) are given in Fig. 7c.



(a) (b) (c)

Fig. 7. ***a)*** *Filtered time signal series,* ***b)*** *the amplitude spectra of the 3 components microtremor data the peak curves (average curve, black line) illustrate the corresponding resonant frequencies and (c) the H/V amplitude spectrums. The dashed lines show standard deviation of amplitude and the two vertical gray areas indicate the peak frequency standard deviation domains.*

SITE CLASSIFICATION FOR THE INVESTIGATION AREA

26 sites were investigated with MASW, ReMi and mikrotremor methods. Velocity profiles were determined for the uppermost 30 m. The P- and S- wave velocities obtained from MASW and ReMi studies at strong motion stations are illustrated in Table 1. The sites were classified in accordance with [14], [15] (Table 1), all of that suggested criteria based on mean V_{s30} of the uppermost 30 m of near surface materials. The NEHRP Provisions suggest six site classes such as A, B, C, D, E, and F for the recognition of site conditions. In this study 2 stations are classified as class B, 16 stations as C and 8 stations to be class D. However, if the stations are classified according to Eurocode 8, then 1 station corresponds to class A, 16 stations B, 7 stations C, and 1 station D which are similar to NEHRP provision. The classes of C, B, and A in NEHRP correspond to classes of B, A, and C in Eurocode 8 system since the boundary values of the class C in the NEHRP system coincide with the boundary values of class B in Eurocode-8, the boundary values of class B come up to the boundary values of class A and the boundary values of class D match with the boundary values of class C. The soil classes in the NEHRP system correspond to that of TBDY-2017 as seen in Table 1.

SITE AMPLIFICATION OF HATAY PROVINCE

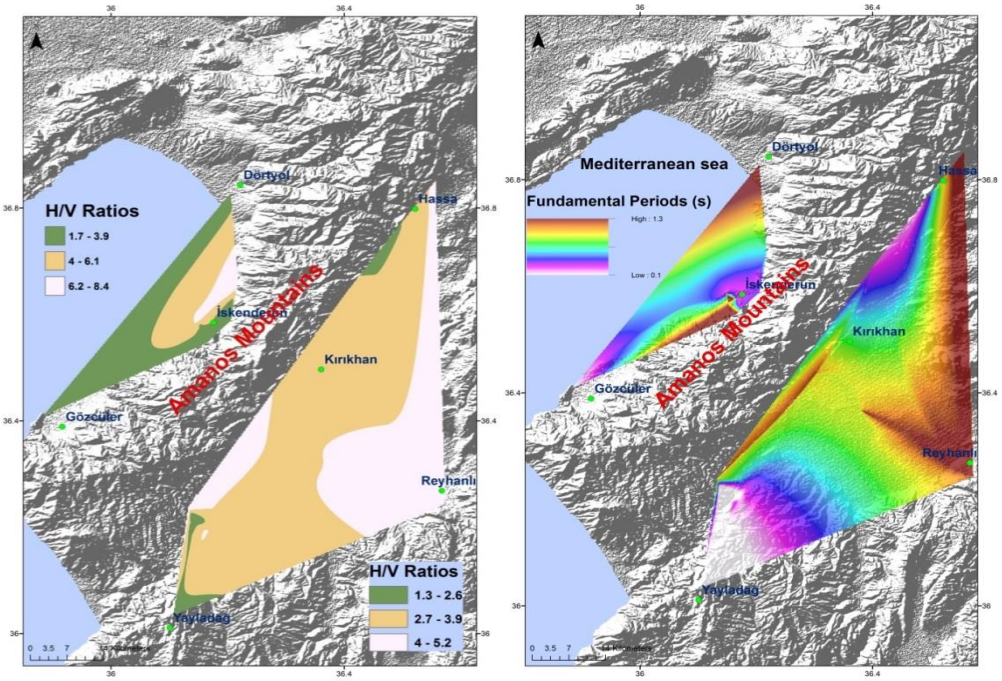
Amplification ratios (H/V) and predominant periods were obtained at 26 locations where microtremor studies were conducted. Soil amplification and pre-dominant periods were interpreted by Geopsy2004 software. The results were used to produce amplification and predominant period maps separately for the areas where the stations located to the east and west of the Amanos mountains of Hatay province (Fig.8 a,b). The H/V peak amplitudes are generally vary in the range of 1.7-3.9 in the coast-lines. H/V ratio was found between 4-6.1 in the plain areas and between 6.2-8.4 on the mountain slopes in the west of Amanos Mountains. The small part of the areas of the investigation area in the east of mountains have H/V values between 1.3-2.6, H/V values of plain area along Hassa-Kırıkhan-Altınözü vary between 2.7-3.9 and that of the mountain slops change between 4-5.2 (Fig. 8a).

The fundamental period values are high (1.3s) at the sea coast north of the study area and gradualy decrases to 0.1s at up to the western slop of the mountains. The fundamental periods are low at the northern sides of Yayladağ and Kırıkhan in the east of the mountains but it gradually increases towards the plains. Fig. 8.b. There is a good agreement between the den H/V ratio and the fundamental period in the study areas. The P- and S-wave distributions are given for every 5m in the study area up to a depth of 30m (Figs. 9. a,b). Through the west of the Amanos Mountains the P-and S-wave velocities of a large part of the area are about 1000m/s and 500m/s respectively. But the velocities increase to about 2000m/s and 1000m/s respectively at the upper slop of the mountain up to 25m of depth. The S-velocity reaches to 2000m/s ate the 30m of depth. To the east of the Amanos Mountains, the P-and S-wave velocities are about 2000m/sand 1000m/s respectively at the 5m of depth around Yayladağ, but increase to 4000m/s and 2000m/s respectively at the deeper depths. The northern sites of the investigation area in this part has P- and S- wave velocities of 2000m/s and 450m/s respectively and that of middle part has about 1250m/s and 500m/s respectively at the top, but they increase around 1500m/s and 650m/s at about 30m of depths.

Table 1. List of the classes for the strong motion stations in Hatay province

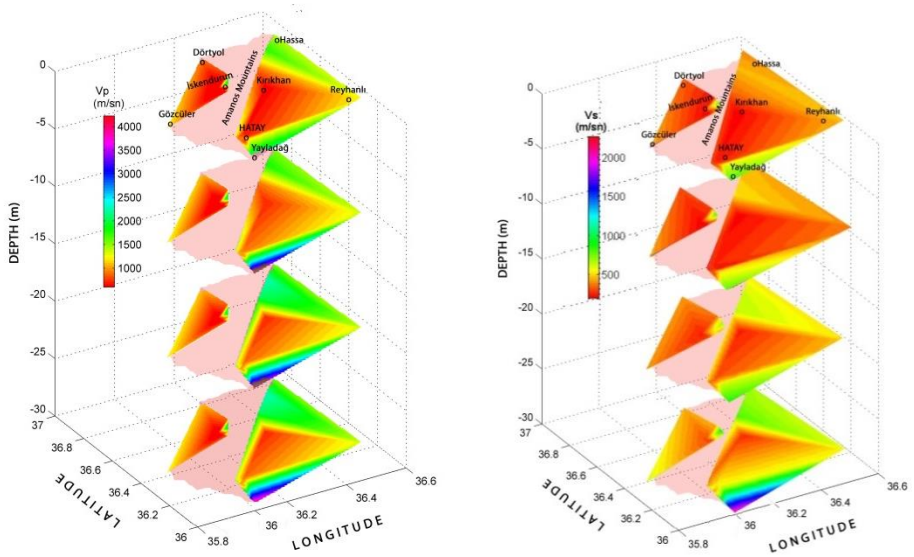
	Station Code	Station Name	Lat (°N)	Lon (°E)	V_{s30} (m/s)	H/V peak amplitude	Predominant period (sn)	NEHRP (MASW)	Eurocode 8 (MASW)	TBDY (2017) (MASW)
1	3112	ISKENDE	36.58801	36.1476	233	6.6	0.2	D	C	ZD

		RUN		6						
2	3113	ISKENDERUN	36.57752	36.15496	221	0.8	1.49	D	C	ZD
3	3114	ISKENDERUN	36.56704	36.15135	215	3.2	0.58	D	C	ZD
4	3115	ISKENDERUN	36.54634	36.16459	424	2.5	1.1	C	B	ZC
5	3116	ISKENDERUN	36.61618	36.20661	781	1.6	0.23	B	B	ZB
6	3117	ISKENDERUN	36.55712	36.17471	597	2.2	0.24	C	B	ZC
7	3119	ISKENDERUN	36.57527	36.16811	374	3.2	0.2	C	B	ZC
8	3120	ISKENDERUN	36.58924	36.20568	455	3.1	0.26	C	B	ZC
9	3121	ISKENDERUN	36.66408	36.21825	271	8.5	0.43	D	C	ZD
10	3134	DORTYOL	36.82763	36.20485	374	1.8	1.04	C	B	ZC
11	3135	ARSUZ	36.40886	35.8831	460	2.9	0.1	C	B	ZC
12	3122	YAYLADAG	36.0343	36.107	1011	2.1	0.19	B	A	ZB
13	3124	GUZELBURC	36.2387	36.1722	283	4.1	0.81	D	C	ZD
14	3125	A.KONUTLARI	36.23808	36.13264	448	5.2	1.06	C	B	ZC
15	3126	AKASYA MAH.	36.2202	36.1375	350	2.06	0.12	D	C	ZD
16	3127	ESENTEPE MAH.	36.21	36.1353	404	3.6	0.16	C	D	ZC
17	3128	ESENLIK MAH.	36.2056	36.1471	329	2.4	0.12	D	C	ZD
18	3129	TURUNCLU	36.19117	36.1343	447	2.06	0.3	C	B	ZC
19	3130	HARBIYE	36.1792	36.145	447	3.2	0.07	C	B	ZC
20	3131	B.YANIK MAH	36.19121	36.16328	567	4.3	0.59	C	B	ZC
21	3132	ORHANLI MAH.	36.20673	36.17159	377	2.49	0.29	C	B	ZC
22	3133	REYHANLI	36.2432	36.5736	471	4.6	1.19	C	B	ZC
23	--	KIRIKHAN (TOPBOĞAZI)	36.43464	36.30166	191	1.6	1.06	D	C	ZD
24	3143	HASSA (AKBEZ)	36.85167	36.5569	444	2.2	1.42	C	B	ZC
25	3144	HACILAR	36.75431	36.48521	485	2.2	1.1	C	B	ZC
26	3145	KIRIKHAN (BALARMUDU)	36.64537	36.40642	533	1.68	0.47	C	B	ZC



(a) (b)

Fig. 8. (a) H/V transfer function variation map, (b) Pre-dominant period



(a) (b)

Fig. 10. (a) P-wave (b) S-wave distribution maps at every 5m in the study area up to a depth of 30m

DISCUSSION

Vs30 velocity values in the west of the Amanos Mountains determined between 215m/s and 781m/s. Vs30 values are decreasing near the sea coast. These velocities are very similar to the velocities achieved by [8], which have been worked at the same stations in the west of the Amanos Mountains. The difference between the obtained Vs30 values ranged from 0.07% to 2.95% and the average change was 0.95%. To the east of the Amanos Mountains the Vs30 velocity values vary between 191m/s and 1011m/s. The lowest value was found at the Kırıkhan Topboğazı site on the Quaternary sediment [4] and the highest value was obtained at the Yayladag station located on the rocky ground (Upper Cretaceous). The sites were classified in accordance with [14], [15, [16], (Table 2). The ground class was found in the west of the Amanos Mountains as C and D according to NEHRP and B and C according to Eurocade-8. In both systems the ground class is calculated as B at (3116) coded (#5) station on the rock. Ground classes are the same in NEHRP and TBDY-2017 systems. To the east of the Amanos Mountains the ground classes are generally C and D according to NEHRP and C and B according to Eurocode-8.

The ground classes were obtained in the Yayladağ station as B according to NEHRP and as A according to Eorocode-8. Ground classes are the same in NEHRP and TBDY-2017 systems in this area. The lowest ground amplification values in the west of the Amanos Mountains were found to be around 0.8 in the 3113 coded (# 2) station and the highest amplitudes were around 8.5 in the 3121 coded (# 1) station and 6.6 in the 3112 coded (# 1) station. The magnification values range from 2.9 to 3.2 in the other investigation area. These values are in good agreement with the values found in [8]. The magnification values of the area from Hassa to the southwest of Kırıkhan vary between 1.6 and 2.2 in the east of Amanos Mountains. These values change between 4.16 and 5.2 in the northern part of the Samandağı, and between 2.06 and 4.3 in the area covering the 3126 (# 15) - 3131 (# 20) coded stations. The magnification value is calculated as 2.1 at the Yayladağ station with code 3122 (# 12) located on Samandağı. In the west of Amanos Mountains, The predominant period was determined as 1.49s around the 3113 (# 2), 1.04s around the 3135 (# 11), and 1.1s around the 3115 (# 4) coded stations indicating the soft sediment thickness.

The predominant period of the rest of the investigation area vary between 0.2-0.58s. The dominant period values in this area are in accordance with the values found in Özgür et al. (2017). In the east of the Amanos mountains, the predominant period was found between 0.47 and 1.42 s in the region from Hassa to Kırıkhan, including Kırıkhan Topboğazı (# 23), 3143 (# 24), 3144 (# 25) and 3145 (# 26) coded stations. The greatest values of the predominant period were recorded at stations 3125 (# 14) and 3133 (# 22) north of Samandağ in the order of 1.06 s and 1.19 s. while the smallest value was found to be 0.07s at 3130 (# 19) coded stations that could be taken into consideration as reference stations. The predominant period values are calculated between 0.19s and 0.58s in other stations in this area,

CONCLUSION

In this study, seismic refraction, MASW, ReMi and microtremor studies were carried out at 26 strong motion stations of AFAD located in the region to evaluate the site effects of the Hatay region. For this aim, the Vs30 profile, site amplification and period of the investigation area were found. The site classifications were determined according to NEHRP, Eurocode-8 and TBDY-2017. The results of the investigation may be considered as a basis for analysis based on MASW, ReMi, and microtremor methods of Hatay province.

REFERENCES

Akbaş, B., Akdeniz, N., Aksay, A., Altun, İ., Balci, V., Bilginer, E., Bilgiç, T., Duru, M., Ercan, T., Gedik, İ., Günay, Y., Güven, İ.H., Hakyemez, H. Y., Konak, N., Papak, İ., Pehlivan, Ş., Sevin, M., Şenel, M., Tarhan, N.,Turhan, N.,

Türkecan, A., Ulu, Ü., Uğuz, M.F., Yurtsever, A. And Others, Turkey Geology Map General Directorate of Mineral Reserach and Exploration Publications. Ankara Turkey. http://yerbilimleri. mta. gov.tr/an.page.aspx)

Beyen, K., Erdik, M., Mazmanoğlu, C., & Ekmekçioğlu, Z. Antakya'nin Geçmişten Günümüze Sismik Aktivitesi Ve Yapilmasi Gerekenlerin Bir Uluslararasi Konferansin Işiğinda Değerlendirilmesi.

Büyüksaraç A, Över S, Geneş M.C., Bikçe M, Kaçin S, Bektaş Ö., 2014. Estimating shear wave velocity using acceleration data in Antakya (Turkey), Earth sci. res. j., Volume 18, Issue 2, p. 99-105, OI:

Çeken, U. and Polat, O., 2014. Investigation of the Local Soil Effects at the New StrongMotion Array (MATNet) in Hatay-K.Maras Region, Turkey, 15-19 December 2014 AGU Fall Meeting, San Francisco-USA, Nr:T13C-4660, p:232.

Emre Özşahin, Mehmet Değerliyurt, 2013. Modeling of seismic hazard risk analysis in antakya (hatay, south turkey) by using gis, International Journal of Innovative Environmental Studies Research 1 (3):31-54.

EUROCODE-8, 2003. Seismic Design of Buildings

Horoz Ş (2008) Adana-Antakya-Kahramanmaraş arasındaki bölgenin depremselliğinin "b" parametresi ile incelenmesi ve risk analizi. Cumhuriyet Üniversitesi Fen Bilimleri Enstitüsü Jeofizik Mühendisliği Anabilim Dalı, Sivas

Irmak, T.S.; Özer, M.F. (1999) "23 Şubat 1995 Kıbrıs depremi kaynak mekanizması", Bayındırlık ve İskan Bakanlığı, Afet İşleri Genel Müdürlüğü, Deprem Araştırma Dairesi, Deprem Araştırma Bülteni, 80, 109-134.

Korkmaz, H. (2006). Antakya'da Zemin Özellikleri Ve Deprem Etkisi Arasindaki İlişki.

NEHRP, 2003. Regulations for New Buildings and other Structures

Över, S., Büyüksaraç, A., Bekta, Ö., & Filazi, A. (2011). Assessment of potential seismic hazard and site effect in Antakya (Hatay Province), SE Turkey. Environmental Earth Sciences, 62(2), 313-326.

Özgür T.Ö., Yamanakab H, Alkan M.A., Çeken U., Öztürk T., Sezen A., 2017. Microtremor Array Measurements for Shallow S-Wave Profiles at Strong-Motion Stations in Hatay and Kahramanmaras Provinces, Southern Turkey, Bulletin of the Seismological Society of America, V. 107, No.1, DOI: 10.1785/0120160218

Park, C.B., Mıller, R.D., and Xıa, J., 1999, Multichannel analysis of surface waves (MASW): Geophysics, 64, 800-808

Tarı, U., Tüysüz, O., Can Genç, Ş., İmren, C., Blackwell, B. A., Lom, N., ... & Beyhan, M. (2013). The geology and morphology of the Antakya graben between the Amik Triple Junction and the Cyprus Arc. Geodinamica Acta, 26(1-2), 27-55.TBDY, 2017. Türkiye Bina Deprem Yönetmeliği

Xıa, J., Mıller, R.D., and Park, C.B., 1999, Estimation of near-surface velocity by inversion of Rayleigh wave, Geophysics, 64, 691-700.

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Effects of Brace Details on Seismic Performance of Concentrically Braced Frames

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Abstract. The ductility of connections is critically important to the performance of steel structures subjected to seismic loading. In non-seismic-prone regions such as Australia, Concentrically Braced Frames (CBFs) are common for their simplicity in design and construction. However, CBF's have limited ductility and therefore possess restricted seismic performance. This paper undertakes an investigation into the effect of brace details in concentrically braced frames using nonlinear finite element modelling. A non-seismically designed industrial steel pipe-rack with simple bolted bracing cleats constructed in the 1950's is selected for analysis. Three cases of brace details and offsets are evaluated: a welded case and two bolted cases with different offsets. The frames are subjected to cyclic forced displacements and evaluations are made by comparing stress distributions, force-displacement hysteresis and energy absorptions. In general, the compression braces suffer from buckling due to their large slenderness. Results also indicate that the welded brace connection absorbed a portion of input energy due to the fixity it created thus showed better energy absorption. The simple bolted cleat connections alleviate stress concentrations in the connecting plates but with increase in brace offset, strength also reduces due to its lower buckling capacity. The findings of this paper give structural engineers insights into the seismic performance of CBF's and options for improvement of non-seismically designed structures.

Keywords— Concentrically Braced Frames, Seismic Design, Finite Element Modelling

INTRODUCTION

In locations of low to mild seismicity, such as Australia, the extent of earthquake design and detailing is reduced in design practice due to other loading conditions, such as wind or imposed loadings, governing the design of structures. Nonetheless, over the past century on average Australia has been subjected to one earthquake event greater than a magnitude 5 each year and one event greater than a magnitude 6 every five years [13] so the consideration of earthquake effects remains important. Concentrically braced frames (CBFs) are those where the frame is arranged such that for the connection of the braces to the frame the work-points for the braces and beams and columns elements are coincident [9]. In Australia the design and detailing of CBFs can be undertaken based on the following ranges of ductility given in AS1170.4 [4] and AS4100 [5]: 1. Limited ductile concentrically braced frames, 2. Moderately ductile concentrically braced frames and 3. Fully ductile concentrically braced Frames. However, requirements for Fully Ductile Structures are considered as outside the scope of these standards.

CBFs are regularly used for seismic design in high seismic regions due to their high stiffness and strength relative to moment resisting frames [14]. Although the use of Eccentric Braced Frames (EBF's) or Special Concentric Braced Frames (SCBF) cannot typically be justified in a low seismic regions there are still advantages to be gained in improving the ductility of concentrically braced frames. This paper provides a literature review of research of the ductility of concentrically braced frame connections. A case study of a CBF in an industrial structure will be analysed in a commercial finite element package ABAQUS to determine if improvements in ductility of a typical simple bracing cleat can be achieved by increasing the offset of the brace. The effect of this offset increase on connection strength will also be investigated.

LITERATURE REVIEW

In The USA, AISC 340-10 Seismic Provisions for Structural Steel Buildings [2] separates the design of braced frames into Ordinary Concentrically Braced Frames (OCBF) and Special Concentrically Braced Frames (SCBF). OCBF's are designed to remain essentially elastic during design level earthquakes, and are expected to be used in relatively low seismic demand areas. The strength of OCBF diagonal brace connections is required to be greater than the applied load using the amplified seismic load. The required connection strength is also limited to the expected yield strength of the brace in tension and expected brace strength in compression. Yoo et al [18] have undertaken an analytical study on connection parameters and their effect on the seismic performance of SCBF's. Results demonstrated that an elliptical clearance model of 6 to 8 times the thickness of plate had an improved performance and minimised the size of the gusset plates required. Okazaki et al [15] undertook experimental testing on the proposed elliptical clearance connection using a shake table test on a 70% scale single-bay, single-story CBF to failure. No damage was observed at the bracing connections and the welds performed well. Further advances in this research by Roeder et al [16] produced the balanced design procedure (BDP).

The aim of the BDP is to balance brace buckling and brace yielding with other complementary ductile yielding mechanisms to ensure drift capacity of the frame is maximised and the frame fails in the preferred manner. Testing demonstrated an average 46% improvement in drift range relative to current AISC Special CBF specifications. A study by Cui et al [8] reviewed the ultimate strength of fillet welds in gusset plate connections subjected to earthquake effects. Testing was undertaken on four specimens to confirm the weld design approach recommended by the Architectural Institute of Japan (AIJ). Bradley et al [7] undertook the full scale cyclic testing of an Ordinary Concentrically Braced Frame in order to expand the experimental performance of frames in mild seismic conditions. Overall, the researchers concluded that the test demonstrated that the design ordinary CBF had significant energy dissipation capacity in the ductile regime however

weld fracture caused a brittle and sudden loss of capacity. Sen et al. [17] undertook an investigation into Non-Ductile Concentrically Braced Frames (NCBFs), or those frames designed prior to 1988 which are not capacity designed and have the potential to experience undesirable failure modes when subjected to current design earthquake loading. Researchers identified deficient brace to gusset welds and non-compliant braces as the most detrimental to the drift capacity of the frame and thus the highest priority for retrofit or repair.

CASE STUDY BY FE MODELLING

The structure investigated in this case study is a concentrically braced frame in a three level pipe rack at an industrial facility. A photo of the existing pipe rack is provided in Figure 1. The pipe rack was constructed in 1953 and consists of 10" (3048mm) wide portal frames spaced at typical 17'6" (5334mm) centres. A concentrically braced frame is provided at every 6th bay along the length of the pipe rack. The original 2 level pipe rack has been extended to include a third piping level at some point in its life.

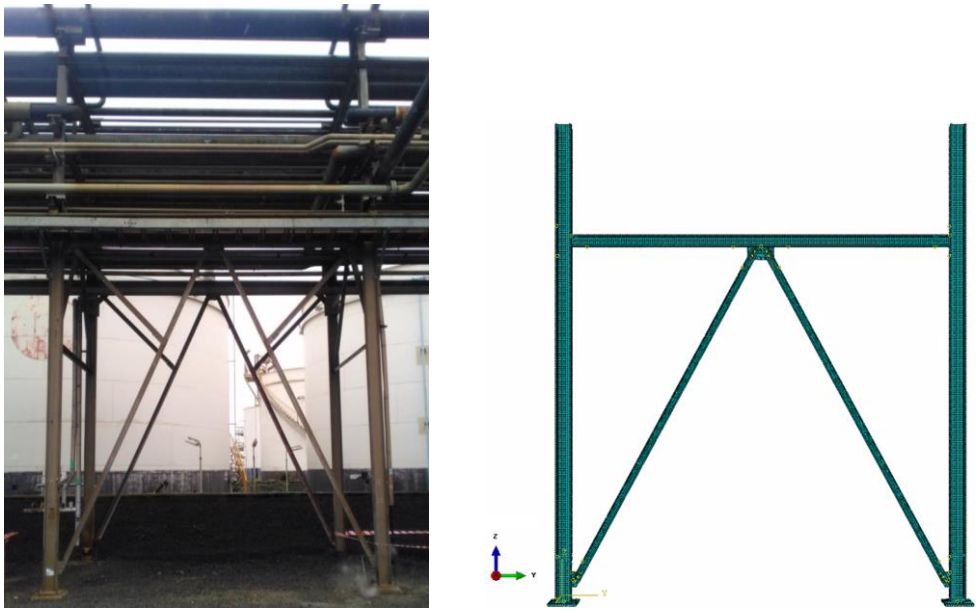


Fig. 1. Concentrically Braced Frame in pipe rack and finite element model

The section properties of the steelwork members in the concentrically braced frame are summarised in Table 1. Metric equivalents have been determined based on dimensions and properties provided in Part II of AS A1 [3]. Material properties were not shown on the available drawings, however reviewing historical steel grades for the era the pipe rack was constructed [10] the properties listed in Table 2 have been adopted assuming that the steel was Grade A1 (AS A1 [3]). Bolt properties have been assumed to be high strength, equivalent to Property Class 8.8 to AS 4291.1 [6].

MODELLING TECHNIQUE

In order to examine the effect clearance could have on the performance of the concentrically braced frame it has been modelled using the finite element software ABAQUS v6.14 [1]. An overview of the finite element model is shown in Figure 1. For the purposed of this analysis, 'clearance' has been adopted as the distance from the face of the column or beam to the edge of the brace as shown in Figure 2. The parts of the concentrically braced frame have been modelled as 8- node linear brick elements with reduced integration (C3D8R). Finer mesh has been used to model the top and bottom gussets in detail, while a coarser mesh has been used for the base plate, brace, column and tie beam. International System of Units (SI) has been used for the model, with all dimensions in metres. For an illustration of the overall model mesh and the finer mesh on the top and bottom gussets, see Figure 3.

The two shorter tie braces have not been considered in the ABAQUS modelling in order to simplify the analysis. The welding of connections between the different members was not modelled explicitly. Instead, a rigid connection between each welded part was assumed in the analysis. This was achieved via a tie constraint between connected parts. Boundary Conditions have been modelled as fixed for both displacements and rotations (encastre) at the hold down bolts locations of both base plates. This reflects the expected restraint from the base plate with a thick base plate and bolts outside the column flange location. In order to provide global stability to the frame a displacement boundary condition restraint in the out of plane direction (U2) has been applied to the top flange of the tie beam and column webs. The restraint to the top flange is not readily available in the real case study, given there is no diaphragm on the tie beams top flange, such as a slab, however

this restraint was used to help convergence in the ABAQUS model. The bolts have also been modelled as 8 node linear brick elements with reduced integration (C3D8R). In order to add pretension to the bolt a load of 36.0kN has been applied to the centre of the bolt under the pretension loading step. The value of 36.0kN was adopted for the bolt, based on CISC Guidelines for the estimated pretension of a snug-tight type bolt [11] which is the type of bolting expected in this application.

TABLE 1
Case Study Steelwork Members Dimensions (All dimensions in mm unless stated otherwise)

Member	Type	Depth	Width	Thickness Flange	Thickness Web	Root Radius
Column	8x6x35#I (ASB 109)	203.2	152.4	16.5	8.9	15.5
Tie Beam	6x5x25#I (ASB 106)	152.4	127.0	14.2	8.4	13.5
Brace	3.5”x3.5”x3/8”L	90.0	90.0	9.5	9.5	8.0

Table 2 Case Study Material Properties

Type	Material Grade	Yield Strength (MPa)	Tensile Strength (MPa)	Density (kg/m^3)	Poisson’s Ratio	Young’s Modulus (GPa)
Members	A1 – AS AS1	236	432	7850	0.3	200
Bolts	PC 8.8 – AS 4291.1	660	830	7850	0.3	200

Table 3 Clearance And Attachment

Case	Fixings	Clearance	Notes
1	Welded	2*t* = 19mm	Rigid Tie Connections between Parts
2	Bolted	2*t* = 19mm	Contact between bolts and brace/gusset parts
3	Bolted	6*t* = 57mm	Contact between bolts and brace/gusset parts

In order to determine the response of the frames to an applied earthquake, a prescribed displacement has been applied to the top flange of the tie beam. A displacement of 5% of the height to the tie beam or 0.25m was adopted as the maximum displacement. The cyclic nature of the earthquake loading was modelled by applying amplitude to the displacement boundary condition. The analysis was run for all three cases with stress (s) and displacement (U) field outputs and specific reaction (RF2) and displacement (U2) history output requested.

RESULTS

Deformed Shapes

Figure 4 shows the deformed shape of the frame of Case 1. It can be observed that the compression braced is buckled due to its high slenderness. Similar deformation patterns were obtained for Case 2 and 3. The highly stressed areas include the beam-to-column joint, and on the top and bottom gusset plates where the brace members are attached to the main frame.

Force-Displacement Hysteresis

The force-displacement hysteresis plots are overlaid on one another in order to compare their characteristics, as shown in Figure 5. All three cases demonstrated similar hysteresis – the frame undergo inelastic deformation at small displacement, and stiffness tend to increase again at a larger displacement. Upon closer inspection of the hysteresis, the frame with welded brace (Case 1) demonstrated higher strength over the other two cases. Case 3 with the largest offset has a higher reaction force of 148.4kN, which is 1.6% and 4.8% higher than for Case 1 and Case 2 respectively. Overall the shape of the hysteresis plots is similar, although Case 3 has a lower force relative to the other cases during the reversal phase for each of the displacement cycles.

Stress Contours

The stress contours of the bottom and top gusset plates are shown in Figure 6 and 7 respectively. For Case 1 where the brace is welded, a significant stress concentration is observed in both top and bottom gusset plate. Such stress concentration is less severe in the bolted cases. Although Case 3 has areas of higher stress compared to Case 2, the majority of these

highly stressed areas are in the fold region, away from the critical weld region, which has lower stresses for Case 3. This is important as previous research [17] has shown that these welds are critical to overall frame performance. Case 3 has higher stress concentration in the top corners relative to Case 2, which is likely due to the additional bending stiffness of the deeper cleat attracting additional force as the frame was displaced.

Energy Dissipation

Energy dissipation is a key parameter to evaluate the amount of absorption by plastic deformation of steel frames. To determine the total energy dissipation, the area within the hysteresis plots was integrated numerically in MATLAB. Results are summarised in Table 4, with the highest energy dissipation occurring in the first case study frame. Case 3 shows the least energy dissipation among the cases investigated.

Strength Checks to AS4100

The strength of the simple bolted cleat was checked for each of the offset cases to determine the effect of the increase offset on the capacity of the connections in other limit states. The program LimCon (v3.63.1.21) [12] was used to check the capacity of the three brace cases in both tension and compression. The six times cleat thickness clearance case (Case 3) resulted in a 20% reduction in strength to AS4100 as the increased offset and associated increase in connection slenderness resulted in lower buckling capacity for the simple bolted cleat. As expected, the increased offset has no effect on the tension capacity of the connection.

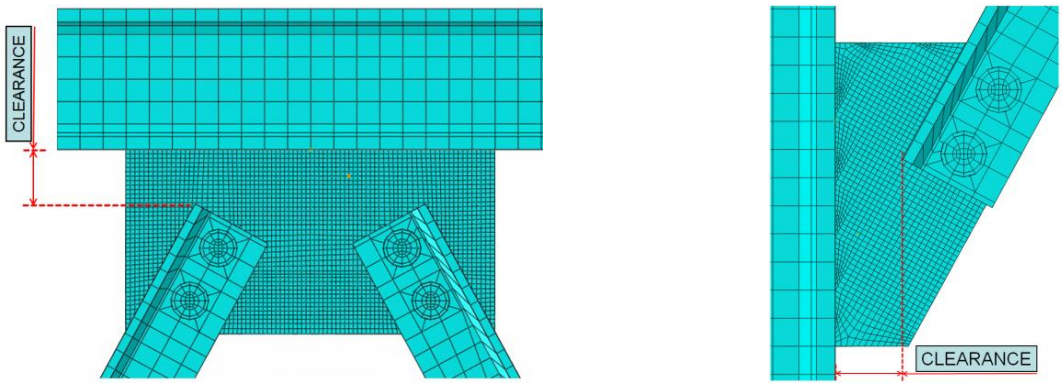


Fig.2. Clearance offset definition

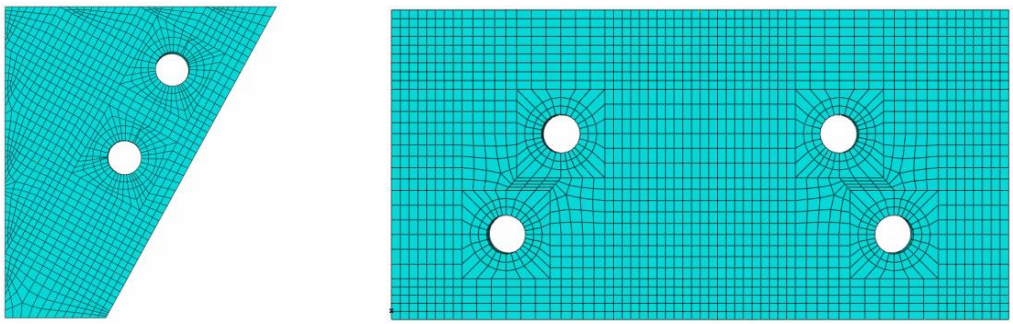


Fig.3. FE model Mesh (a) Bottom Gusset and (b) Top Gusset

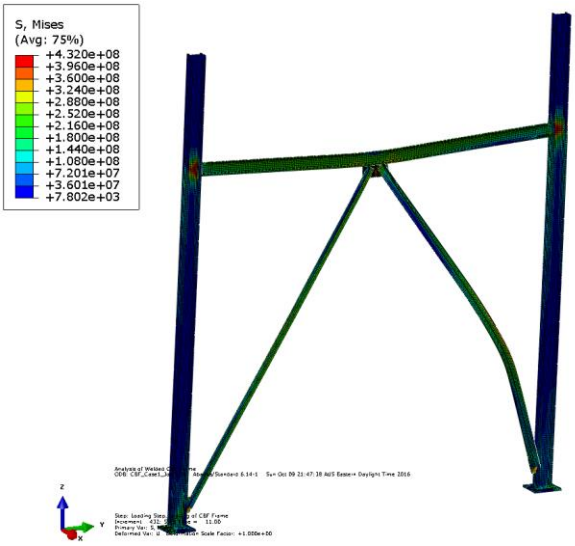


Fig.4. Deformation of frame in Case 1

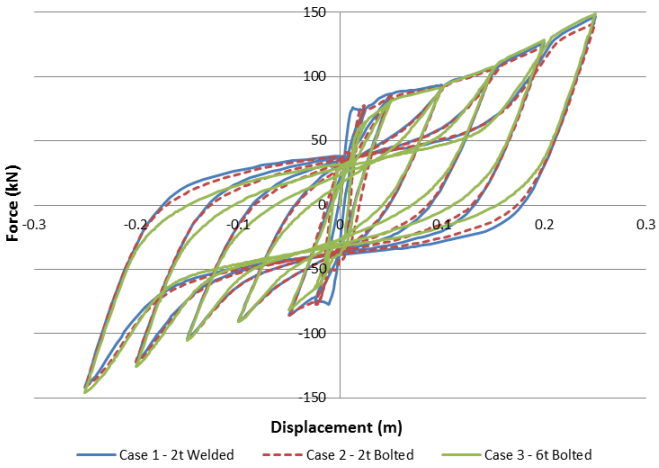
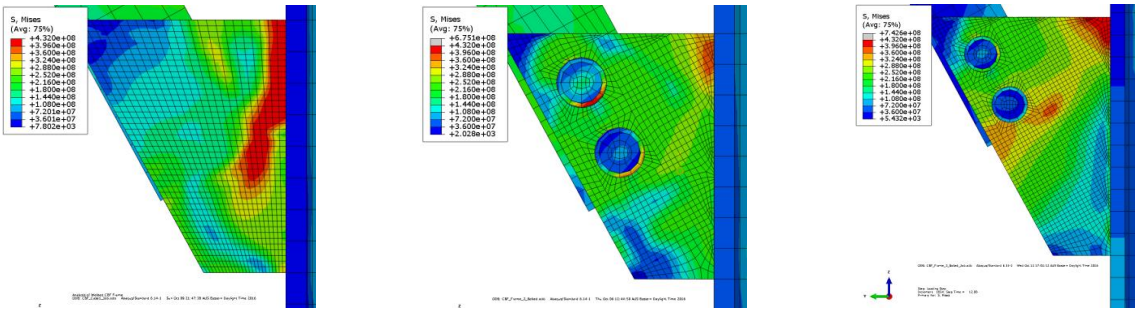
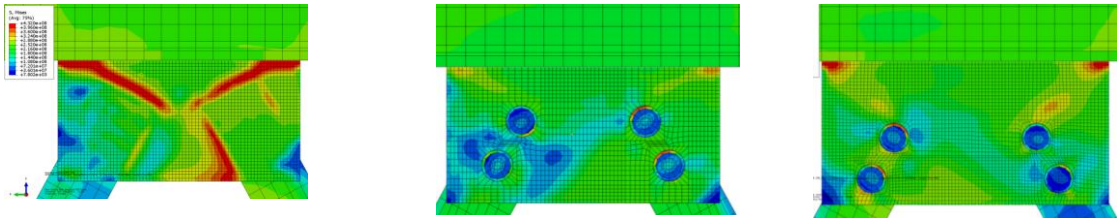


Fig.5. Force-Displacement Hysteresis Loops



(a) (b) (c)

Fig. 6. Bottom Cleat Stress Plots (a) Case 1; (b) Case 2 and (c) Case 3



(a) (b) (c)

Fig. 7. Top Cleat Stress Plots (a) Case 1; (b) Case 2 and (c) Case 3

Table 4 Energy Dissipation

Case	Fixings	Clearance	Energy Dissipation (kJ)
1	Welded	2*t* = 19mm	93.8
2	Bolted	2*t* = 19mm	91.8
3	Bolted	6*t* = 57mm	75.9

CONCLUSION

In this paper, the seismic performance of a concentrically braced frame is investigated. The effects on brace connection details are studied via nonlinear finite element modelling. The analysis conducted in this paper indicates that bolted simple brace connections have an improved stress distribution when subjected to seismic loading compared to their welded equivalent with similar offset between the column/beam and brace. The model with increase offset of six times gusset thickness (Case 3) also showed improvements in stress distribution compared to the base case study model which had a more typical 2 times gusset thickness offset (Case 1). Reviewing the energy dissipation of the three cases, the welded brace connection (Case 1) achieved the highest value. On the other hand, there was a reduction in energy dissipation of the frame as the offset increased. It is believed this reduction is due to the increased flexibility of the cleat plate when offset is increased.

REFERENCES

ABAQUS v6.14. (2014). Providence, RI, USA: Dassault Systèmes Simulia Corp.

AISC. (2010, 6 22). ANSI/AISC 341-10. Seismic Provisions for Structural Steel Buildings. Chicago, Illinois, USA: American Institute of Steel Construction.

AS A1. (1956). Australian Standard Specification for Structural steel (excluding plates) and Australian standard rolled steel sections for structural purposes. Standards Association of Australia.

AS1170.4. (2007). Structural design actions - Part 4: Earthquake actions in Australia. Standards Australia Limited.

AS4100. (2012). Steel structures. Standards Australia Limited.

AS4291.1. (2015). Mechanical properties of fasteners made of carbon steel and alloy steel - Bolts, screws and studs. Standards Australia.

Bradley, C., Fahnestock, L. A., Hines, E. M., & Sizemore, J. (2015). Full-Scale Cyclic Testing of an Ordinary Concentrically-Braced Frame. In N. Ingraffea, & M. Libby (Ed.), ACSE Structures Congress 2015 (pp. 702-713). Portland, Oregon: American Society of Civil Engineers.

Cui, Y., Asada, H., Kishiki, S., & Yamada, S. (2012). Ultimate strength of gusset plate connections with fillet welds. Journal of Constructional Steel Research(75), 104-115.

Hamburger, R. O., & Nazir, N. A. (2002). Seismic Design of Steel. In W.-F. Chen, & C. Scawthron, Earthquake Engineering Handbook. CRC Press .

Kotwal, S. (2000). MP 84 - Evolution of Australian Standards for structural steel. Standards Australia International Ltd.

Kulak, G. L. (2005). High Strength Bolting for Canadian Engineers. Toronto, Ontario: Canadian Institute of Steel Construction.

LimCon v3.63.1.21. (2014). Exton, PA, United States: Bentley Systems.

McCue, K. F., Dent, V., & Jones, T. (1995). The characteristics of Australian strong ground motion. Proceedings 5th Pacific Conference of Earthquake Engineering (NZSEE and AEES). Melbourne.

Nascimbene, R., Rassati, G. A., & Wijesundara, K. K. (2012). Numerical simulation of gusset plate connections with rectangular hollow section shape brace under quasi-static cyclic loading. Journal of Constructional Steel Research, 70, 177-189.

Okazaki, T., Lignos, D. G., Hikino, T., & Kajiwara, K. (2012). Dynamic response of a chevron concentrically braced frame. Journal of Structural Engineering, 139(4), 515-525.

Roeder, C. W., Lumpkin, E. J., & Lehman, D. E. (2011). A balanced design procedure for special concentrically braced frame connections. Journal of Constructional Steel Research, 67(11), 1760-1772.

Sen, A. D., Swatosh, M. A., Ballard, R., Sloat, D., Johnson, M. M., Roeder, C. W., ... & Berman, J. W. (2016). Development and Evaluation of Seismic Retrofit Alternatives for Older Concentrically Braced Frames. Journal of Structural Engineering, 143(5), 04016232.

Yoo, J. H., Lehman, D. E., & Roeder, C. W. (2008). Influence of connection design parameters on the seismic performance of braced frames. Journal of Constructional Steel Research, 64(6), 607-623.

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Using Role-Playing Exercises to Promote Soft Skill (Pervasive Skill) Development

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Abstract. The use of active teaching methods to develop pervasive skills has many advocates globally. As prior research provides evidence of the value of role-playing exercises in the development of pervasive skills, the objective of this article is to examine the extent to which South African (SA) accounting academics use role-playing exercises (an active teaching method) as a method of instruction, and to establish their views on whether this method can be used to develop pervasive skills. An electronically administered questionnaire was sent to SA accounting academics. The findings of this article reveal a gap in the use of role-playing exercises by SA accounting academics when compared to their counterparts globally. This gap can be attributed to the reluctance of academics to develop pervasive skills due to time constraints, an already loaded syllabus, and the perception that academics are not responsible for developing pervasive skills.

Keywords— Academics, accounting, active learning, pervasive skills, soft skills, role-playing exercises.

INTRODUCTION

The accounting profession and academics globally have acknowledged that role-play as a means of instruction, is a powerful approach when developing pervasive skills. However, the use of this particular method of instruction has not been adopted to the same extent in South Africa (SA) as it perhaps has in other countries. Possible reasons for this are that the academics rely on the South African Institute of Chartered Accountants (SAICA) to guide them on methods of instruction (Keevy 2016), and the academics' reluctance to embrace their academic freedom by engaging the accounting literature on suitable delivery methods (Samkin and Schneider 2014). Therefore, the objective of this article is to examine the use of role-playing exercises by accounting academics in SA, and to establish their views on whether this method can be used to transfer pervasive skills to students.

The direction of accounting education has received considerable debate for almost two decades. The debates stem back to the 1980s with the Bedford Committee Report (American Accounting Association (AAA 1986), followed by the "Big Eight" White paper (AAA 1989), and ultimately resulting in the formation of the Accounting Education Change Commission (AECC) (AECC 1990). The role of the AECC was to promote changes in accounting teaching and learning practices with the intention of preparing graduates for the business environment (AECC 1990; Cotton, Rainsburg and Scott 2002). The business environment changed drastically due to globalization, business complexity, advances in technology and proliferating regulations (Albrecht and Sack 2000; Shuayto 2001; International Federation of Accountants (IFAC) 2010). These overarching forces of change resulted in a need for accounting graduates to be proficient in not only technical competencies but also pervasive skills (Albrecht and Sack 2000; De Lange, Gut and Jackling 2006). As expressed by Raelin (2000, 10): "rather than learning job-specific skills, workers will be asked more and more to learn situation-specific principles attending to a given work domain. By mastering these principles, workers can be expected to handle ongoing variability in work demands".

The growing body of accounting literature suggests that academics were not preparing graduates fully for the future profession (AAA 1986; Albrecht, Smith, Stocks and Woodfield 1994; Adler and Milne 1995; Adler and Milne 1997; Anes, Hassall, Joyce and Arquero Montańo 2005; Cargill, Gammie and Hamilton 2010), given that technical competencies were developed to the detriment of pervasive skills (Adler and Milne 1995; Adler and Milne 1997). Consequently, this necessitated a change, as academics could not "save accounting education by continuing to do more of the same" (Albrecht and Sack 2000, 3).

In light of this, the IFAC developed a set of education standards in 2003 encompassing both technical and pervasive skills (IFAC 2014). As an IFAC member, SAICA introduced the Competency Framework in 2008 as part of its qualification model. Instead of simply focusing on the technical competencies typically taught in SA universities, this Competency Framework highlighted pervasive skills. Therefore, both technical and pervasive skills would form part of SAICA's academic curriculum.

Authors have stressed that in order to address pervasive skills, academic programmes should supplement the traditional lecture-based classes with active learning practices (AAA 1986; AECC 1990; Adler and Milne 1997; DeNeve and Heppner 1997; Kern 1999; IFAC 2014). DeNeve and Heppner (1997, 232) posit that "effective teaching is fast becoming synonymous with the facilitation of active learning techniques". According to Ryan and Martens (1989, 20 as quoted in Bonwell and Eison 1991), passive learning occurs when students are merely the "receptacles of knowledge". Role-playing exercises have been described as an active learning method (Janvrin 2003; IFAC 2014; Lazar 2014) which renders a meaningful improvement to students' learning (Lazar 2014). By "seeing and doing", students improve their understanding of technical matters (Kirstein and Plant 2011, 9). As conveyed by Petty (1994), "I am told, and I forget. I see, and I remember. I do, and I understand" (6).

The benefits of role-playing exercises have been widely documented in accounting literature. This article's contribution therefore is to provide insights into the use of an active learning method, such as role-playing exercises in SA, by academics whose traditional strengths are technical teaching. The reasons for the reluctance of SA academics to develop pervasive skills are also highlighted.

LITERATURE REVIEW

Nature of role-playing exercises

McKeachie (1986, 174 in DeNeve and Heppner 1997) perceives role-play as the creation of an essentially unstructured situation where students are required to portray their conception of certain assigned roles. It requires improvisation (Kern 1999) and imagination, as the role-player is required to "step into the life of another without a script" (Lazar 2014, 236). In some instances, students can either create their own scenario or act out the scenario provided by the academic (Crumbley, Smith and Smith 1998). The role-players need to visualise that they are either themselves or in another person's shoes in a specific situation (Lazar 2014). Role-playing scenarios attempt to create real-life situations that may or may not take place in reality (Babst, DeGarmo, Harth and Reinalda 2006; Baglione 2006). Otte and Truscheit (2004) advocate that role-playing exercises are equivalent to real world situations.

Role-playing exercises may involve only a few active participants, while the rest of the class observe the role-play and afterwards reflect on and discuss the scenario (Lightbody 1997; Mintz 2006; Rudman and Terblanche 2011). For example, in Amernic and Craig's (1994) study, the entire class was briefed on the role-playing scenario and the characters. This was followed by a few students acting out the role-play while the rest of the class served as the audience. Bonwell and Eison (1991) advocate that the students who are not performing the role-play still benefit by providing a commentary on the exercise. Another form of role-play is when the lecturer debates against himself/herself in front of the class (Bonwell and Eison 1991). Kirstein and Plant (2011) used a role-playing exercise where the lecturer acted as narrator while the students had to take up different roles within the business process. Multiple role-plays can also take place within a classroom setting where various groups act out the role-play at the same time in the same room (Amernic and Craig 1994). For example, Christensen and Eining (1994) divided the class into groups of six. Each group member was assigned one of the roles within a case study and the individual groups were given time for discussion. When the class resumed, each group shared its perspective on the case study by the members taking on their different roles. Crum and Haskin (1985) are in favour of this type of role-playing exercise as opposed to having one set of players dominating the spotlight.

A benefit of role-playing is that no special equipment or material is required (Bonwell and Eison 1991). Kirstein and Plant (2011) merely used a lecture hall. This method also actively engages students in the learning process (Babst et al. 2006) by bringing "issues to life" (IFAC 2014, 122) and takes the knowledge learnt beyond the classroom setting (Babst et al. 2006). With this in mind, a role-playing exercise should involve preparation, enactment and reflection (Lazar 2014). For a role-play to be effective, Crum and Haskin (1985) suggest that there should only be two to three characters, and that the problem should have differences of opinion or values, be non-theatrical and be based on learning objectives that highlight the problem-solving process. Moreover, the objectives of a role-playing exercise should be to create student interest in the subject matter and to apply technical content (DeNeve and Heppner 1997).

The literature criticized facilitators for not retaining control in the classroom (Amernic and Craig 1994; Babst et al. 2006; Rudman and Terblanche 2011), not having the requisite skills for this method (Amernic and Craig 1994; Rudman and Terblanche 2011), for lacking preparation (Lazar 2014), and for not allowing sufficient time to conduct the role-playing exercise (Rudman and Terblanche 2011). Furthermore, important technical knowledge may be excluded if the role-playing exercise is "too entertaining or frivolous" (Ments 1989, 27, as conveyed in Amernic and Craig 1994). However, most of these issues can be overcome by sending the facilitator for training (AECC 1998).

According to the literature, students may not cooperate or want to partake in the exercise (Lightbody 1997; Rudman and Terblanche 2011); resist being in an active learning environment (Bonwell and Eison 1991), which may not be supportive (Kirstein and Plant, 2011; Lazar 2014); and need to understand the theory before the role-playing exercise can resume (Rudman and Terblanche 2011). However, Amernic and Craig (1994) perceive that even though there are disadvantages to role-plays, the skills that are transferred to students far outweigh the negatives. Babst et al. (2006) concur, as they posited that role-playing results in deep learning and that students will remember the exercise long after the class has ended.

Role-playing exercises can take place in many forms and in combination with other methods. They can be incorporated with a case study (Berry 1993; Amernic and Craig 1994; Fatt, 1995; Boyce, Kelly, Williams and Yee 2001; Babst et al. 2006; Carrol 2007; Kirstein and Plant 2011; IFAC 2014); performed in a group (Scott 1972; Berry 1993; Lightbody 1997; Kern 1999; Mintz 2006; Carrol 2007; Paulson 2011; IFAC 2014; Lazar 2014); included in a lecture (DeNeve and Heppner 1997; Lightbody 1997; Grace 2006; IFAC 2014.) or presentation (Paulson 2011); and be used subsequently with self-assessment and reflection (Babst et al. 2006; Mintz 2006; Lazar 2014). However, regardless of how this method is employed, the literature provides a host of competencies that can be developed using role-playing exercises.

Summary of the pervasive skills that can be developed by employing role-playing exercises

This section provides a summary (Table 1) of the pervasive skills that were developed using role-playing exercises. To obtain the summary, a literature search was conducted to establish whether accounting professional bodies and academics use role-playing exercises to transfer pervasive skills to students. This assisted in answering the objective of the paper of whether there is a gap in the use of role-playing exercises by SA accounting academics compared to their global counterparts.

A literature search was used to identify and retrieve empirical studies that were relevant to whether role-playing exercises can be employed to develop pervasive skills. The search was limited to empirical studies written in English. To ensure coverage of empirical studies on the topic, the literature search included peer-reviewed journal articles, conference papers, masters' theses and doctoral dissertations. The keywords and descriptors used in the search included accounting, accounting teaching, assessment, learning, role-playing exercises and role-playing learning. Based on the literature search, the pervasive skills that could be developed using role-playing exercises were linked to the literature search sources.

SAICA's Competency Framework recognises pervasive skills as being part of three categories, namely ethical behaviour and professionalism (IA), personal attributes (IB), and professional skills (IC). These categories are further subdivided into eight (IA), ten (IB) and seven (IC) competencies (SAICA, 2009). The table below details the pervasive skills that could be developed using role-playing exercises in these three categories.

Table 1 Summary of the pervasive skills that could be developed using role-playing exercises

(IA) Ethical Behaviour and Professionalism
(IA) 1. Protects the public interest
Amernic and Craig 1994; Christensen and Eining 1994; Fatt 1995; Crumbley et al. 1998; Molyneaux 2004; IFAC 2006; Mintz 2006; Carrol 2007; Beard, Schweiger and Surendran 2008; Wu and Yang 2009; Rudman and Terblanche 2011; IFAC 2014.
(IA) 2 Acts competently with honesty and integrity
Amernic and Craig 1994; Fatt 1995; Crumbley et al. 1998; Molyneaux 2004; IFAC 2006; Mintz 2006; Carrol 2007; Beard et al. 2008; Wu and Yang 2009; Paulson 2011; Rudman and Terblanche 2011; IFAC 2014.
(IA) 3. Carries out work with a desire to exercise due care
Amernic and Craig 1994; Fatt 1995; Crumbley et al. 1998; Molyneaux 2004; IFAC 2006; Mintz 2006; Carrol 2007; Beard et al. 2008; Wu and Yang 2009; Paulson 2011; Rudman and Terblanche 2011; IFAC 2014.
(IA) 4. Maintains objectivity and independence
Amernic and Craig 1994; Christensen and Eining 1994; Fatt 1995; Crumbley et al. 1998; Molyneaux 2004; IFAC 2006; Mintz 2006; Carrol 2007; Beard et al. 2008; Wu and Yang 2009; Paulson 2011; Rudman and Terblanche 2011; IFAC 2014.
(IA) 5. Avoids conflict of interest
Amernic and Craig 1994; Fatt 1995; Crumbley et al. 1998; Molyneaux 2004; IFAC 2006; Mintz 2006; Carrol 2007; IFAC 2006; Beard et al. 2008; Wu and Yang 2009; Rudman and Terblanche 2011; IFAC 2014.
(IA) 6 Protects the confidentiality of information
Amernic and Craig 1994; Fatt 1995; Crumbley et al. 1998; Molyneaux 2004; IFAC 2006; Mintz 2006; Carrol 2007; Beard et al. 2008; Wu and Yang 2009; Rudman and Terblanche 2011; IFAC 2014.
(IA) 7. Maintains and enhances the profession's reputation
Amernic and Craig 1994; Fatt 1995; Crumbley et al. 1998; Molyneaux 2004; IFAC 2006; Mintz 2006; Carrol 2007; Beard et al. 2008; Wu and Yang 2009; Rudman and Terblanche 2011; IFAC 2014.
(IA) 8. Adheres to the rules of professional conduct.
Amernic and Craig 1994; Fatt 1995; Crumbley et al. 1998; Molyneaux 2004; IFAC 2006; Mintz 2006; Carrol 2007; Beard et al. 2008; Wu and Yang 2009; Rudman and Terblanche 2011; IFAC 2014.
(IB) Personal Attributes
(IB) 1. Self-manages
Scott 1972; Babst et al. 2006; Paulson 2011.
(IB) 2. Demonstrates leadership and initiative
Bonwell and Eison 1991; DeNeve and Heppner 1997; IFAC 2006; Paulson 2011; Lazar 2014.
(IB) 3. Maintains and demonstrates competence and recognises limits
Amernic and Craig 1994; Paulson 2011; IFAC 2014.
(IB) 4. Strives to add value in an innovative manner
Lightbody 1997; Janvrin 2003; Babst et al. 2006; Paulson 2011.
(IB) 5. Manages change
Janvrin 2003; Rudman and Terblanche 2011.
(IB) 6. Treats others in a professional manner
Bonwell and Eison 1991; Berry 1993; Amernic and Craig 1994; DeNeve and Heppner 1997; Crumbley et al. 1998; IFAC 2006; Mintz 2006; Carrol 2007; Paulson 2011; IFAC 2014.
(IB) 7. Understands the national and international environment
Crum and Haskin 1985; Amernic and Craig 1994; Fatt 1995; DeNeve and Heppner 1997; Lightbody 1997; Crumbley et al. 1998; Boyce et al. 2001; Babst et al. 2006; Baglione 2006; Kirstein and Plant 2011; Paulson 2011; IFAC 2014.
(IB) 8. Is a life-long learner
Scott 1972; AAA 1986; SAICA 2015.
(IB) 9. Works effectively as a team member
Bonwell and Eison 1991; Berry 1993; Amernic and Craig 1994; DeNeve and Heppner 1997; Lightbody 1997; Crumbley et al. 1998; Baglione 2006; IFAC 2006; Carrol 2007; Paulson 2011; Rudman and Terblanche 2011; Lazar 2014; Gordan and Thomas 2016.
(IB) 10. Manages time effectively
Rudman and Terblanche 2011; IFAC 2014.

(IC) Professional Skills
(IC) 1. Obtains information
Janvrin 2003; Babst et al. 2006; Paulson 2011; Gordan and Thomas 2016.
(IC) 2. Examines and interprets information and ideas critically
Crum and Haskin 1985; Bonwell and Eison 1991; Amernic and Craig 1994; Berry 1993; Lightbody 1997; Babst et al. 2006; Mintz 2006; Carrol 2007; De Villiers 2010; Kirstein and Plant 2011; Paulson 2011; Rudman and Terblanche 2011; Gordan and Thomas 2016.
(IC) 3. Solves problems and makes decisions
Crum and Haskin 1985; Amernic and Craig 1994; DeNeve and Heppner 1997; Lightbody 1997; Crumbley et al. 1998; Kern 1999; Janvrin 2003; IFAC 2006; Mintz 2006; Carrol 2007; Paulson 2011.
(IC) 4. Communicates effectively and efficiently
Scott 1972; AAA 1986; Berry 1993; Amernic and Craig 1994; Crumbley et al. 1998; Janvrin 2003; Babst et al. 2006; IFAC 2006; Carrol 2007; Paulson 2011; Gordan and Thomas 2016.
(IC) 5. Manages and supervises
IFAC 2006; Carrol 2007; Paulson 2011; IFAC 2014.
(IC) 6. Understands how IT impacts a CA's daily functions and routines
Janvrin 2003; Rudman and Terblanche 2011; Gordan and Thomas 2016.
(IC) 7. Considers basic legal concepts
Scott 1972; Christensen and Eining 1994; DeNeve and Heppner 1997; Rudman and Terblanche 2011; IFAC 2014.

The above summary provides evidence that all 25 (eight IA, ten IB and seven IC) of SAICA's pervasive skills can be developed using role-playing exercises, as each competency is linked to one or more source. Therefore, this study provides one active method that can be used by academics to enhance the development of pervasive skills in their accounting pedagogy.

RESEARCH METHOD

To achieve the objective of this study, a structured web-based questionnaire was used as the research instrument to ascertain whether academics use role-playing exercises and whether this method can be used to develop pervasive skills. The questionnaire was administered to all SA accounting academics who provide instruction to aspirant chartered accountants (CAs) (SAICA 2012).

The questionnaire consisted of two sections of mostly closed-ended questions of a quantitative nature. Comments boxes comprising the qualitative aspect of the questionnaire were included at the end of each section, allowing for descriptive responses to enrich and expand the research results. The questionnaires were pilot tested by a selected group of academics. A data controller was used to set up an online website where the questionnaire could be answered and the data recorded.

The questionnaire, containing a dedicated uniform reference, was sent via email to the participants. The participants were directed to a website and asked to complete the questionnaire by clicking on the uniform reference. The completed questionnaires were electronically collated by the data controller. Means, medians, standard deviations, minimums and maximums were calculated.

Population and response rate

The population for the empirical work consisted of all SA accounting academics providing instruction to aspirant CAs (SAICA 2012). In total, 443 emails were dispatched to the academics and 147 responses were received. It must be noted that none of the questions in the questionnaire were compulsory and the participants could refrain from answering a particular section, or questions in a section. This explains why the participants did not necessarily answer all of the questions. For section one, the effective response rate was 33% (147/443) and for section two, 32% (142/443).

EMPIRICAL FINDINGS

Academics' views on the use of role-playing exercises during their academic programmes

In the first section, the academics were asked to indicate whether they use role-playing exercises in their academic programmes. The data analysis of this question is set out in Table 2 below and is based on the use of role-playing exercises subsequent to the SAICA releasing its Competency Framework. This is indicated by the number of academics who noted that they use role-playing exercises and is presented in the "applied" column. A percentage was calculated using the applied column, which represents the percentage of academics who indicated that they use this method.

Table 2 Academics' views on their use of role-playing exercises for development after SAICA introduced the Competency Framework

	Applied	**%**	**n**
The use of role-playing exercises for purposes of development	19	12.9	147

Key: Applied = number of academics who use role-play exercises, % = percentage of academics who use role-playing exercises, n = number of respondents who answered the question.

A mere 12.9% of respondents employ role-playing exercises in their academic programmes. However as far back as 1986, the AAA (1986) highlighted role-play as a suitable method to transfer pervasive skills. Furthermore, in 2000, Albrecht and Sacks (2000) asked academics what learning activities they view as effective. At that time, 15.3% of the academics were employing role-playing exercises in their academic programmes and 34.1% of the academics considered role-playing exercises as an effective teaching method. The summary (Table 1) provides evidence from various academics and professional bodies of the competencies that can be transferred when employing role-playing exercises. Therefore, it would be expected that more SA accounting academics would use role-playing exercises in their academic programmes.

One respondent was of the opinion that the syllabus for technical aspects was already burdensome and left little time for pervasive skills development: The syllabi for technical competencies are too full to also have time to develop pervasive skills. Another respondent remarked that pervasive skills are difficult to address at university: Apart from written communication, I don't see how the pervasive skills can realistically be developed and assessed at university.

However, Els (2007) and the IFAC (2014) noted that technical competencies and pervasive skills are complementary. Furthermore, several academics have succeeded in developing pervasive skills using technically orientated role-playing exercises. For example, Boyce et al. (2001) allowed students to adopt different roles such as chief executive officer, financial controller, board member and employee. Equally, Christensen and Eining (1994) used a role-playing exercise to address legal issues, which created ethical awareness among students, and Carrol (2007) used a transfer pricing role-playing scenario. Consequently, academics should integrate pervasive skills with their teaching of technical content.

A respondent commented that academics are not responsible for addressing pervasive skills:

Our job is to teach the technical stuff. The pervasive skills can only be observed indirectly when assessing the work of the student, but it is very difficult to teach it in large groups.

This view was shared by another respondent, who remarked: Pervasive skills should predominantly be acquired during the training contract, not at university. Firms are devolving their training costs to universities where it does not belong. While the findings of Strauss-Keevy (2014) agree with the aforesaid observation, the accounting profession generally disagrees with this view. As Otte and Truscheit (2004) and others have noted, role-playing exercises are equivalent to real world situations. Therefore, academics should develop role-playing exercises that stimulate the business environment.

Academics' views on the use of role-playing exercises to transfer categories IA, IB and IC of the pervasive skills

In the second section, the views of academics were sought on whether role-playing exercises can be applied in the transfer of categories IA, IB and IC. The data analysis of this question is set out in Table 3 below, and is based on whether academics hold that role-playing exercises can be applied in the development of the three categories of pervasive skills. A percentage has been calculated based on the applied column, representing the percentage of academics who indicated that this method can be applied in the transfer of each category.

Table 3 Academics' views on whether role-playing exercises can be applied in the development of category IA, IB and IC

	IA		IB		IC		
	Applied	**%**	**Applied**	**%**	**Applied**	**%**	**n**
The use of role-playing exercises for purposes of development	36	25.4	61	43.0	59	41.6	142

Key: Applied = number of academics who indicated that role-playing exercises can be applied; % = percentage of academics who indicated that role-playing exercises can be applied; n = number of respondents who answered the question

More respondents' view that role-playing exercises can be employed when transferring pervasive skills (Table 3) than respondents who actually use this method (Table 2). Bonwell and Eison (1991) reveal that academics do not change their teaching practices as "things are the way they are today because that is the way they have always been" (54). Therefore, the results suggest the possibility of role-playing exercises being employed further by academics in their teaching practices. In addition, respondents' indicated that role-play exercises can be applied more effectively when addressing category IB and IC compared to category IA. Bearing in mind that the IA category includes skills such as honesty, integrity, due care and objectivity,

One respondent remarked that the attributes relevant to category IA are difficult to address: I do not believe that ethical behaviour and professionalism to be attributes or skills that could be taught or developed at this late stage of a persons' life.

*Another respondent supported this view by stating:*True ethics can never be examined. The only way someone will determine whether or not he/she is ethical is when they are faced with an ethical dilemma. Students know what the right answer is but that does not necessarily mean that they will make the right decision in practise.

Nevertheless, several academics have succeeded in delivering IA competencies through role-playing exercises (Janvrin 2003; Mintz 2006; Kirstein and Plant 2011; Rudman and Terblanche 2011). Therefore, academics should engage the accounting literature on creative ways in addressing the pervasive skills.

CONCLUSIONS, RECOMMENDATIONS AND AREAS FOR FUTURE RESEARCH

Academics need to move from lecture-based education pedagogy to more active learning methods. The article set out to examine the use of role-playing exercises – an active learning method – by SA accounting academics, and to establish their

views on whether this method can be used to transfer pervasive skills to students. The results indicated that very few SA accounting academics use role-playing exercises in their academic programmes. . However, more hold the view that it can be used to develop pervasive skills. Therefore, the results suggest the possibility of role-playing exercises being employed further by academics in their teaching practices.

Certain academics remarked that they do not know how to develop pervasive skills. For example, one academic remarked:

Apart from written communication, I don't know how pervasive skills can be realistically developed and assessed at university.

Time constraints and a full syllabus were reported as the reasons for not developing pervasive skills. However, the accounting literature has emphasized that technical competencies and pervasive skills are complementary. Therefore, academics should integrate pervasive skills while using a technically orientated role-playing exercise. Certain academics also expressed that they are not responsible for the development of pervasive skills, and that the training programmes should be tasked with the implementation of these abilities. However, this is in conflict with the accounting literature, where both the academic and training programmes play a part in the transfer of pervasive skills.

Therefore, it is suggested that academics from different SA universities collaborate to develop specific role-plays that simulate the business environment. Academics were also asked whether role-playing exercises could be applied in the development of the three categories of pervasive skills. Academics expressed difficulty in the development of attributes relevant to ethical behaviour and professionalism, such as honesty, integrity, due care and objectivity. This was encapsulated in the following comment: *True ethics can never be examined. The only way someone will determine whether or not he/she is ethical is when they are faced with an ethical dilemma. Students know what the right answer is but that does not necessarily mean that they will make the right decision in practise.*

However, as far back as 1986 (AAA 1986), it was suggested that role-playing exercises are a powerful approach in developing pervasive skills. Therefore, despite the reluctance of certain academics to use this method, it is suggested that they engage the accounting literature on how this method can be effectively utilised when addressing pervasive skills. A limitation of the study was that academics were merely asked whether role-playing exercises could be used to develop the different categories of pervasive skills.

Consequently, further research is required to ascertain why academics view that role-playing exercises are more suitable in transferring the personal attributes category consisting of skills such as leadership, life-long learning, managing change, and the professional skills category consisting of skills such as communication, problem solving and critical thinking. This study is useful from a SA context, given the adoption of the Competency Framework. However, as SAICA's competencies are aligned to other professional bodies, this study can also inform academics from other countries who similarly have a technical focus, on the pervasive skills that can be developed using role-playing exercises.

REFERENCES

Adler, R. W., & Milne, M. J. (1995). Increasing learner-control and reflection: Towards learning-to-learn in an undergraduate management accounting course. Accounting Education, 4(2), 105-119.

Albrecht, W. S., Clark, D. C., Smith, J. M., Stocks, K. D., & Woodfield, L. W. (1994). An accounting curriculum for the next century. Issues in Accounting Education, 9(2), 401.

Arquero, J. L. (2001). Accounting Education: Charting the Course Through A Perilous Future. Accountig Education Series, vol. 16.

Baglione, S. L. (2006). Role-playing a public relations crisis: Preparing business students for career challenges. Journal of Promotion Management, 12(3-4), 47-61.

Beard, D., Schwieger, D., & Surendran, K. (2008). Integrating soft skills assessment through university, college, and programmatic efforts at an AACSB accredited institution. Journal of Information Systems Education, 19(2), 229.

Berry, A. (1993). Encouraging group skills in accountancy students: an innovative apporach. Accounting Education, 2(3), 169-179.

Bonwell, C., & Eison, J. (1991). Active learning: Creating excitement in the classroom AEHE-ERIC higher education report No. 1.

Boyce, G., Williams, S., Kelly, A., & Yee, H. (2001). Fostering deep and elaborative learning and generic (soft) skill development: the strategic use of case studies in accounting education. Accounting education, 10(1), 37-60.

Carrol, A. (2007). Team Assessment Task for Management Accounting: A Divisional Management Case Study Approach. E-Journal of Business Education & Scholarship of Teaching, 1(1).

Christensen, A., & Eining, M. M. (1994). Instructional case: Software piracy-Who does it impact?. Issues in Accounting Education, 9(1), 151.

Craig, R., & Amernic, J. (1994). Roleplaying in a conflict resolution setting: Description and some implications for accounting. Issues in Accounting Education, 9(1), 28.

Gammie, E., Cargill, E., & Hamilton, S. (2010). Searching for good practice in the development and assessment of non-technical skills in accountancy trainees–a global study. Aberdeen: Robert Gordon University.

Hassall, T., Joyce, J., Montaño, J. L. A., & Anes, J. A. D. (2005, December). Priorities for the development of vocational skills in management accountants: A European perspective. In Accounting Forum (Vol. 29, No. 4, pp. 379-394). Elsevier

Lazar, A. (2014). Setting the stage: Role-playing in the group work classroom. Social Work with Groups, 37(3), 230-242.

Lightbody, M. (1997). TEACHING NOTE Playing factory: active-based learning in cost and management accounting. Accounting Education, 6(3), 255-262.

Mintz, S. M. (2006). Accounting ethics education: Integrating reflective learning and virtue ethics. Journal of Accounting Education, 24(2), 97-117.

Molyneaux, D. (2005). After Andersen: An experience of integrating ethics into undergraduate accountancy education. Journal of Business Ethics, 54(4), 385-398.

Paulson, E. (2011). Group communication and critical thinking competence development using a reality-based project. Business Communication Quarterly, 74(4), 399-411.

Raelin, J. A. (2000). Work-based learning: The new frontier of management development. Addison-Wesley.

Rudman, R. J., & Terblanche, J. (2011). Practical role-play as an extension to theoretical audit education: a conceptualising aid. Southern African journal of accountability and auditing research, 11(1), 63-74.

Samkin, G., & Schneider, A. (2014). Using university websites to profile accounting academics and their research output: a three country study. Meditari Accountancy Research, 22(1), 77-106.

Scott, R. A. (1972). The Study of Partnership Accounting through Role Playing. The Accounting Review, 47(3), 610-612.

Shuayto, N. (2002). A study evaluating the critical managerial skills corporations and business schools desire of MBA graduates.

Strauss-Keevy, M. (2014). Education programmes' responsibilities regarding pervasive skills. Journal of Economic and Financial Sciences, 7(2), 415-432.

Yang, H. L., & Wu, W. P. (2009). The effect of moral intensity on ethical decision making in accounting. Journal of Moral Education, 38(3), 335-351.

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Investors' Herding Behaviors under Different Market Conditions: Evidence from Thailand

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Abstract. The purpose of this research is to examine the existence of investors' herding behavior in Thailand and whether their collective trading behaviors destabilize the countries' stock markets. This study shows that the herding behavior is present in all sectors in Thailand, namely consumer discretionary, consumer staples, energy, finance, healthcare, industrial, infotech, materials, and utilities. The two sectors that exhibit the least herding magnitude are the utilities and energy. The Industrial and healthcare sectors show the largest herding magnitude. There is no evidence of the herding activities for securities in the telecommunication sector. Examining the herding activities when the overall Thai equity market experiences an extreme movement of negative or positive returns which is determined as the biggest negative returns and positive returns at the 1% of the lower and upper tail of the market return distribution shows strong herding activities among investors in Thailand. Portfolios of stock in utilities and healthcare exhibit the strongest herding activities in response to a significant move in the market. However, half of the ten sectors also exhibit the presence of herding behavior under the normal tranquil periods. These five sectors are consumer discretionary, healthcare, industrial, financial, and materials. It is interesting to note that the magnitude of herding behavior of these five sectors is much more smaller during periods of the normal market movement than the extreme market, suggesting that herding activities are more pronounced when overall market moves in the extreme negative or positive direction. The Wald Tests of equal herding activities between the normal and extreme market movement also confirm the finding of asymmetric herding behavior of investors during the extreme market movement than the normal periods. Further test of herding activities of each sector during the bullish and bearish market indicates that investors herd when overall market went up and down in consumer discretionary , energy, health care, and financial sectors. The larger magnitude of coefficient in up market points to possible stronger herding activities during the bullish market for consumer discretionary, healthcare, and financial sectors. Investors in the consumer staples and infotech sectors tend to herd only when the market experienced a downturn. There was no evidence of herding activities of the market participants in utilities, communications, industrials, and materials sectors in either bearish or bullish periods.

Keywords— Market Efficiency, Herding Behavior, Volatility, Financial Crisis

INTRODUCTION

Herding is generally characterized as the human's psychological tendency to imitate the behavior of others, resulting in a group of people behaves in a similar fashion. Nofsinger and Sias (1999) defined herding in financial markets as when a group of investors trade in the same direction for a period of time, and thus moving in and out of markets as a group. According to Bikhchandani and Sharma (2001), the cause of herding behavior can come from three reasons. First, investors do herd because they believe others have private information that is revealed through their superior return on their trading strategies. Second, investors do herd in order to maintain their compensation scheme and employment continuity. Third, investors do herd to satisfy their own preference of conformity with the others by disregarding their prior belief. While the first two reasons are construed as being rational form of investors' herding behavior, the last reason is conformed with irrational view of investor psychology (Devenow and Welch, 1996).

Over the years, herding behaviorial analysis in equity markets has emerged as an important area of research for academic researchers as well as practitioners. This issue is very important because it has some implications for financial market participants, policymakers, and regulators. The collective herding activities resulting in correlated trade patterns will potentially reduce the benefits of portfolio diversification and may create securities mispricing, potential bubbles, financial instability and hinder the effectiveness of trade regulations imposed by financial regulators, resulting in a negative effect on the social welfare, and market destabilization (Chang et.al., 2000; and Chiang and Zheng, 2010; Hwang and Salmon, 2004; Tan et.al., 2008). Most of the prior research on herding behavior concentrates on the developed markets or some of the prominent emerging markets. Recent studies by Chan, Cheng, and Khorana (2000) reported the absence of pervasive herding behavior in the United States, Hong Kong, South Korea, Taiwan, and Japanese stock markets. This study, however, focuses on Thai and Turkish equity markets.

The purpose of this research is to examine the existence of investors' herding behavior in Thailand and whether their collective trading behaviors destabilize the countries' stock markets. There are many reasons that make examining of herding behavior in Thailand emerging country of particular interest. First, the equity markets in Thailand are one of the fastest-growing and largest emerging markets in Asia and Europe. The growing importance of these markets has been attracting international investors for profit-making opportunities in the recent decades. Therefore, studying possible herding behavior is important as market participants' investment behavior affects share price, volatility, and arbitrage opportunities. Second, equity markets in Thailand exhibit fundamental characteristics necessary for maintaining long-term economic growth, which include large geographical areas, cheap labor forces, emergence of middle class, and growth in purchasing power. Examining herding behavior in this market is crucial for determining price pattern and recognizing profitable trades, the discovery of which should allow us to explicitly conclude whether certain countries characteristics will affect the likelihood of herding behavior. Third, the return dynamics behaviors of this emerging market are quite different from those

of mature markets in terms of high volatility and potential of steep price falls (Bekaert and Harvey, 1997; De Santis and Imrohoroglu, 1997; Patel and Sarkar, 1998).

These particular features are unique for examining whether investor's behavior is changing depending on the market conditions. In particular, investors are more likely to suppress their own beliefs but follow the market consensus during the periods of high uncertainty, volatility, and significant market downturn. Fourth, the Thai and equity markets have long been criticized for their inefficiency and relatively risky due to the lack of educated and well-informed investors, different culture and economics setting, illiquidity, market thinness, nonsynchronous trading, incomplete security laws and weak trading regulatory law enforcement, loose accounting report requirements and low degree of information disclosures (Barkoulas and Travlos, 1998). These failures along with the collective-oriented culture in which people are discouraged to deviate from the others may possibly lead to the existence of herding behaviors in these two emerging markets (Chang et. al, 2000; Demirer & Kutan, 2006). Fifith, the equity markets of Thailand have experienced many episodes of crisis including financial crisis, natural crisis, and political crises. Events surrounding these crises established a strong venue for the analysis of the investors' psychology and trading behavior and investment practices for emerging markets. While popular press and practitioners often ascribed the financial crises to herding behaviors on the part of investors, this research will attempt to test whether investors do herd particularly during the periods of uncertainty around these crises. High uncertainty would deprive investors from relying on their own judgments to make sound investment decisions, but simply resort to the market consensus. Therefore, examining herding behavior will provide a fruitful understanding regarding price formation and possible profit-making opportunities in these largest growing emerging markets in Asia and Europe.

This paper will contribute to the literature in herding behavior in many ways. First, this research will extend the behaviorial research on investors' herding to equity markets in Thailand, which are highly sensitive to herding behavior based on the aforementioned reasons. It is the first study that investigates industrial herding in this market. Second, this research will extend the prior research in herding behavior by incorporating the factors on herding such as return dispersions volatility, trading volume, trading volatility, and market fundamentals factors. This will allow us to disentangle various factors that affect investors' herding behavior. Third, this study examines the herding behaviors under different market regimes and various crises unique to these countries as warranted by many occurrences of financial and political crises throughout the history, as well as the recent global financial crisis in 2007-2008. Fourth, this research is the first study that thoroughly investigates whether changes in the market regulations and market microstructures have major dramatic change in investor's herding behavior. The equity markets of Thailand have gone through sequential revolutions including the introduction of internet trading platform in 2000, the launch of Bond Electronic Exchange in 2003, and the establishment of derivative future exchange trading in 2004. These innovative developments can have potential effect on investor's trading behavior (Chang et al, 2000). Fifth, this study also investigates investors' herding behavior around asymmetric business cycle based on the announcement of macroeconomics variables.

The linkage between investors' herding and macroeconomics indicators is novel to this study. The remainder of the paper is organized as follows. In the next section, we review the literature for investors' herding behavior. In this section, a comprehensive review of stock returns behavior in Thailand is also provided. Section 3 describes our data and summarizes the descriptive statistics of stock returns in Thailand including the cross-sectional absolute deviation (CASD), a measurement of herding activities. In section 4, we present in details the testable hypotheses and the descriptions of methodologies. The empirical results are also presented in this section. Section 5 offers some concluding remarks.

LITERATURE REVIEW

There is a vast published empirical literature in investment behavior of market participants in the U.S. and to other countries in Asia, and Europe. The herding behavior literature can be categorized into three different groups. The first strand of research attempts to uncover whether a specific group of market participants tend to mimic the decisions of others. The second strand of research focuses on the reasons why market as whole differentiates between stocks. The third strand of research focuses mainly on the motivation and underlying causes of herding activities of the market participants.

Many studies in the herding behavior have attempted to document the existence of herding behavior of individual investors, institutional investors, and mutual fund managers and financial institutions. Christie and Huang (1995) are among the earlier pioneer in investigating for the herding behavior in the U.S. stock market but fail to find evidence in support of herding activity of market participants. Grinblatt et al. (1995) investigated herding behavior among mutual fund managers but documented weak evidence in support of herding activity. Choi and Sias (2009) showed that institutional investors herd by following the similar investment decision in buying and selling stocks in the same industry during the same time period. Using the mutual fund trade data, Wermers (1999) found evidence in support of herding activities among mutual fund managers gearing toward small stocks and growth stocks.

Dennis and Strickland (2005) supported the notion of herding behavior among institutional investors by providing that the numbers of shares held by institutional investor are inversely related to its return on the day the market drops but positively related during the market rises. In addition, the stock price of company with high level of institutional ownership will be driven significantly below its fundamental value during the severe market drops. Examining the trading behavior of pension fund managers after the financial market liberalization, Bohl and Voronkova (2005) reported intensified herding activity on the part of Polish institutional investors, when compared with advanced markets. Venezia et al (2011) found supporting evidence of herding among investors towards companies with smaller size and low systematic risks. In addition, their studies also discovered that amateur investors exhibit stronger tendency to herd than professional investors. Demirer et al. (2014) and Yao et al (2014) provided further evidence that herding behavior is more prevalent at the industry level than the country level.

The second strand of research geared toward understanding the way market participants discriminate among the different stocks. Christie and Huang (1995) are the pioneers in investigating the conjecture that investors tend to herd or cluster around the market for their investment strategy during the period of market stress with high volatility. They failed to find evidence in support of herding in the U.S. market. Chang et al. (2000) examined the investment behavior in regard to the propensity to herd of investors in international markets and found evidence of herding in Japan, Taiwan, South Korea, but not the U.S. and Hong Kong. In addition, the intensity of herding effect is greater in the down markets than the up markets, suggesting an asymmetry in herding behavior. Khan et al. (2001) reported evidence of herding behavior in four European markets including France, Germany, Italy, and England. Herding behavior in these European countries tend to occur during the normal period as opposed to the periods of market turmoil and crisis.

Among others who explored the herding issue on the part of investors, Chiang and Zheng (2010) are the first to investigate the spillovers in herding from the U.S. to other stocks market around the world. Using the daily returns from eighteen advanced and emerging markets, they showed that both volatility and herding formation in the U.S. have some influences on the herding activities in the rest of the world. They found evidence in of herding in some Asian and advanced markets, with the exception for the U.S. market. Examining herding behavior in Chinese Share A and Share B stocks, Tan et al. (2008) documented evidence of herding activity in Share A by domestic investor and Share B by foreign investors. However, they were not able to identify any interaction between Shanghai and Shenzhen stock markets with respect to herd formation. Evidence of herding activities in China during the falling market and high trading volume is also confirmed by Lao and Singh (2011). Examining the Gulf Arab stock markets, Balcilar et al. (2013) showed that market participants in Abu Dhabi, Dubai, Kuwait, Qatar, and Saudi Arabia do herd under the different market regimes.

However, herding behavior occurs during the crash market for all countries with the exception of Qatar, where herding occurs more under the high volatility regime. Evidence reported by Balcilar et al (2013) suggested that the cross-market herding effects among these countries can be explained by herding co-movement rather than the spillovers. Ouarda et al. (2013) investigated the herding behavior of European financial markets and report evidence of herding behavior among investors during the periods characterized by high trading volume and strong volatility. Herding behavior in European markets is also revealed during the periods of the 2008 global financial crisis and the 1997 Asian crisis. Studies by Yang et al. (2015) revealed a change in the herding behavior of major Asian markets toward the American market. The herding behavior of market participants in the Pacific countries toward the U.S. is asymmetric during the bull and the bear cycles, while the herding effect is more pronounced during the bear. Using the markets for American Depository Receipts (ADR), Demirer et al. (2014) found evidence of herding behavior for the ADRs from Chile and Korea emerging markets only, but not from the ADRs of the developed markets of Australia, France, Germany, Ireland, Italy, Japan, Netherlands, and Switzerland.

Study by Hsieh (2013) showed that both institutional and individual investors in Taiwan do herd, while the institutional investors exert stronger tendency to herd more on companies with smaller size and low turnover and follow positive feedback trading, the individual investors also herd more on smaller size companies but high turnover and buy (sell) stocks with negative (positive) past returns. The casual relationship between herding activities and stock market volatility is also noted by Blasco et al (2012). Using the Spanish stock market from 1997-2003, Blasco et. al (2012) showed that the higher level of the herding activity, the greater the level of stock market volatility as measured by absolute return residuals, historical volatility, and implied volatility. Consistent with the herding literature, Lam and Qiao (2015) found evidence of herding among investors in Hong Kong during the period of upswings, high trading volume, and extremely high and low volatility. In addition, they also conjectured that short-term nature of herding activity is related to the introduction of short-selling and option trading in 1993. Yang et al. (2015) observed the changes in herding behavior of countries in Asia Pacific towards the American stock during the major crises including Asian financial crisis, internet bubble, September 11, SARs outbreak and Global financial crisis.

The notion of herding behavior was not supported by many prior studies. Unlike herding behavior, adverse herding occurs when investors strongly discriminate between individual stocks which cause a high dispersion in the stock returns from the market returns during the high volatile market. Using the U.S. data, Christie and Huang (1995) found evidence of high dispersion in the stock return from the market during the high volatile market. The notion of adverse herding is also supported by Gleason et al. (2004) who studied the ETF market. Huang and Salmon (2004) examined time-varying herding behavior of investors in U.S. and South Korea and reported that herding activity tend to vanish or become adverse during the market run-up and turmoil such as the Asian and Russian crises. Huang and Salmon (2009) further argued that adverse selection is more likely to present when there is a high divergence of opinion among market participants. Study by Klien (2013) also lends support to the notion of herding spillovers between the U.S. and the Eurozone markets during the market turmoil. In addition, adverse herding is more intensified during the period of high market volatility.

While prior literature documented the existence of herding behavior by market participants or the lack thereof, the third strand of research focus on revealing the underlying cause of herding behavior and motivation to herd. Scharfstein and Stein (1990) pointed out the mutual fund managers tend to herd and follow others' investment strategies in order to keep their reputations and performance. Their finding is also supported by Dass et al (2008) who suggested that the herding activities of mutual fund managers in order to keep relative performance among their peers have resulted in the 1990s dot com bubble. Banerjee (1992) argued that investors observed other investors' trading behavior in order to obtain private information and implement the same investment strategies. Demarzo et al (2004) pointed out that the herding behavior among investors was influenced by what it is so called "community effect", as investors find the need to keep up with their peers by following others' investment strategies. Substantial evidence of community effects for selecting stocks among market participants are also supported by Brown et al (2008) and Shemesh and Zaptero (2014). Venezia et al. (2011) revealed that amateur investors tend to herd more than professional investors as a result of their lack of investment experience and financial knowledge.

The herding behavior among investors in different countries can mainly explained by the differences in the external environments and inner psychology. Using Hofstede's (2001) individualism and uncertainty avoidance index as proxies for external national culture, Schemeling (2009) pointed out that these factors have strong influence in the market participants' tendency to herd and overreact. Adopting the same individualism index as one of the measures in cultural differences, Chui et al. (2010) reported a positive relationship between individualism index and profits obtained from momentum trading strategy. Chang and Lin (2015) showed that the differences in the national culture, as measured by power distance, individualism, and masculinity index have strong influence in determining investors' herding behavior. Besides national culture factors, investors' excessive optimism, overconfidence, and the disposition effect are among the behavior pitfalls factors that determine investor's tendency to herd. Study by Chang and Lin (2015) further showed that herding behavior is very common among Confucian, less mature and sophisticated stock markets.

DATA

The data used to investigate herding in the Thai stock markets consists of daily price index and trading volume of 350 stocks traded on the Stock Exchange of Thailand (SET). In this study, the SET are selected because they are the best representative stock exchanges of Thailand and Turkey. The SET stock exchanges are the largest stock exchanges in Thailand in terms of number of listed companies, stock turnover ratio, and transaction volumes. The continuously compounded daily return of each stock on the SET and ISE is computed as, , where represents the closing ISE 100 index value at the end of the month and is the prior month closing value. The data cover the periods from January 1988 to July 2015. The period covers the June 4, 1989 event, the 1997 Asian financial crisis, the 1998 Russian crisis, the 2000 technology bubble, the 2001 September 11 event, 2004 Tsunami crisis, and 2006 political crisis in Thailand, and 2008 mortgage subprime debt crisis. All the data are obtained from the Bloomberg and Stock Exchange of Thailand and Stock Exchange of Turkey.

We use the SET 100 index, which is the equally-weighted market returns with cash dividends reinvested as a proxy for market returns in Thailand. Similarly, we used the ISE 100 index, which is the equally-weighted market returns with cash dividends reinvested as a proxy for market returns in Turkey. We use 1-day repo rate as a risk-free rate for Thailand. For the risk-free rate in Turkey, we used the one-month overnight interbank loan rates from January 1990 to 2015. Follow the studies of Lam (2010) and Lam et al. (2011), we construct market fundamental factors such as size (SMB), book-to-market (HML), momentum (WML), and liquidity (LIQ) factors and examine their impacts on the herding behavior.

To further examine whether changes in market regulations and microstructure have any significant impact on changes in the herding behavior, we divide the full sample periods into three sub-periods. For equity markets in Thailand, the first sub-period is from January 1970 to December 2000. This is time period when internet trading platforms were first introduced by the Stock Exchange of Thailand on November 13, 2000 . The second sub-period starts from January, 2001 to December 2003. This is the time period when the Stock Exchange of Thailand launched the Bond Electronic Exchange (BEX) on November 26, 2003. The purpose of the BEX is to provide electronic trading platform for the Thai bond market and to make Thai bond market progress toward meeting international standard and comparable with the bond markets form the rest of the world. The third sub-period starts from January 2004 to December 2014. This is the period when the Future Exchange (TFEX) was established and granted license and permission to trade the derivatives from the Securities Exchange Commission (SEC) for the first time on May 17, 2004. The herding study for Turkish equity market is also divided into three sub-periods. To ensure that the three cutoff periods dictate a significant breakpoint for detecting herding behavior, we implemented the Bai-Perron multiple breakpoints test, Chow's break point test and Chow's forecast test, and Quant-Andrews breakpoint tests. The results justify the use of the end of 2000 and 2003 in investigating herding behavior in Thai equity market.

Table 1 shows a relatively low average daily returns, standard deviation, and median for all the sectors in Thailand. During the period study, the financial sector generates the lowest average daily returns of 0.01% and the health care sector generates the highest average returns of 0.11%. The average daily returns range from a minimum of -43.70% for consumer discretionary to a maximum of 37.41% for materials sectors. The healthcare sector shows the least volatility of 0.29%, while the daily returns of the telecommunication sector exhibit the most volatility of 2.49%. All the sectors daily returns show a departure from normality as shown by significant Jarque-Bera test statistics.

Table 1
Descriptive Statistics of the Average Daily Returns of Each Sector of Thai Equity Markets

	Sectors	Numbers of Firms	Observatons	Mean	Median	Maximum	Minimum	Standard Deviation	Skewness	Kurtosis	Jarque-Bera	P-Value
1	Consumer Discretionary	130	6,401	0.0730	0.0000	10.8520	-10.3960	1.3360	-0.1944	9.2179	10352	0.0000
2	Consumer Staples	60	6,398	0.0580	0.1100	26.4900	-32.9510	1.0640	-0.8963	45.2472	476661	0.0000
3	Energy	23	5,891	0.0230	0.1900	22.0740	-18.9780	2.4210	-0.0143	8.8651	8444	0.0000
4	Healthcare	20	5,559	0.1190	0.1060	22.3200	-30.3700	0.2929	0.4023	14.0023	28188	0.0000
5	Industrial	119	6,392	0.0190	0.0850	15.3100	-19.5150	2.2180	-0.5075	7.3599	8817	0.0000
6	Financial	159	6,401	0.0170	0.0620	16.5200	-15.7090	2.0740	0.1667	8.9462	9460	0.0000
7	Infotech	42	5,667	0.0007	0.0850	15.3100	-19.5150	2.2180	-0.1356	9.1046	8817	0.0000
8	Materials	84	6,380	0.0330	0.1000	37.4150	-43.7060	2.0550	-0.7141	55.3555	72917	0.0000
9	Telecommunications	8	5,717	0.0230	-0.0050	15.3130	-22.1250	2.4940	0.1260	7.5509	4949	0.0000
10	Utilities	15	4,360	0.0740	0.0990	18.4760	-11.9470	1.9480	0.1804	8.0097	4583	0.0000

Table 2 reports the summary statistics of CSAD of all the ten section. The telecommunication sector has the lowest average CSAD of 1.75% and variations of 1.18%, while the stocks in the Industrial sector show the highest CSAD of 2.84% with the highest volatility of 15.03%. The CSAD ranges from a minimum of 0.00% to a maximum of 57.41% in the consumer staples sector. The average cross-sectional absolute deviations for all sectors are relative low, which is a good indication of the presence of herding activities in these sectors.

Table 2
Descriptive Statistics of the Average Cross-Sectional Absolute Return Dispersion (CSAD) of Each Sector

	Sectors	Numbers of Firms	Observations	Mean	Median	Maximum	Minimum	Standard Deviation	Skewness	Kurtosis	Jarque-Bera	P-Value
	$CSAD_t = \frac{\sum_{i=1}^{N} \lvert R_{i,t} - R_{m,t} \rvert}{N}$											
1	Consumer Discretionary	130	6401	2.2480	2.1650	12.5770	1.4570	1.4570	0.9971	6.2420	3,864	0.0000
2	Consumer Staples	60	6398	2.3640	2.0560	57.4110	0.0000	1.4880	12.8160	405.6050	43,400	0.0000
3	Energy	23	5345	1.9850	1.6410	13.7880	0.0660	1.3090	2.7830	15.3749	41,005	0.0000
4	Healthcare	20	4862	2.3510	1.7650	19.5530	0.0320	2.0130	2.9984	15.2791	37,830	0.0000
5	Industrial	119	6364	2.8420	2.4110	22.1000	0.4160	15.0300	2.5090	14.5062	41,784	0.0000
6	Financial	159	6401	2.4700	2.0860	12.0570	0.0000	1.3100	2.5980	12.0033	28,820	0.0000
7	Infotech	42	5667	2.4710	2.0720	23.4040	0.0930	1.5310	3.3324	25.6655	131,792	0.0000
8	Materials	84	6372	2.7717	2.3015	73.3159	0.2953	1.8973	14.8716	492.0367	63,731,035	0.0000
9	Telecommunications	8	5261	1.7530	1.4608	12.5240	0.0022	1.1852	2.3341	12.1604	23,211	0.0000
10	Utilities	15	3473	1.8604	1.4860	16.8069	0.0396	1.4066	2.8597	18.1041	37,747	0.0000

METHODOLOGY

Literature in herding behavior of investors focused on the return dispersion of the securities relative to the return dispersion of overall markets. In the presence of herding behavior in which investors suppress their own belief and comply with the general consensus of the market in making investment decisions, security returns tend to converge to the market returns resulting in low equity market dispersion. Therefore, herding effect can be estimated by the use of statistical measures of cross-sectional standard deviation measure (CSSD) proposed by Christie and Huang (1995) and cross-sectional absolute deviation (CSAD) of individual stock returns proposed by Chang et al (2000) and Chiang and Zheng (2010). In this paper, we examine the herding patter of investors in Thailand and Turkey based on the CSSD and CSAD measures.

Research Question 1: Do investors in Thailand herd?

Assessing herding behavior in a particular market requires a measure of the extent to which investors differentiate among stocks for investment purposes. If herding behaviors do exist in each country stock markets, the security returns will not deviate from the overall market return because investors make similar decisions and therefore, dispersion of equity returns (CSSD or CSAD) should be relatively low. The seminal work of Christie and Huang (1995) which uses the stock return dispersion around the market or CSSD as a measure of herding behavior is calculated as follows:

$$CSSD_t = \sqrt{\frac{\sum_{t=1}^{N} (R_{i,t} - R_{m,t})^2}{N-1}} \quad \text{.....(1)}$$

Where N is the total numbers of firms in the portfolio, $R_{i,t}$ is the actual stock return of each firm i at time t, and $R_{m,t}$ is the cross sectional average returns of N stocks in a portfolio at time t. However, the problem of using CSSD as a measure of return dispersion is that the value of CSSD will be biased when the data has some outliers. To solve the issue of outliers, Chang et al. (2000) modified the CSSD measure by taking the aggregate absolute value of the difference between individual

stock return and market return rather than squaring them. The newly modified CSAD dispersion of equity return can be calculated as follows:

$$CSAD_t = \frac{\sum_{i=1}^{N} \left| R_{i,t} - R_{m,t} \right|}{N} \quad \text{…..……...(2)}$$

Where | . | is defined as the absolute value operator.

According to rational expectations hypothesis, the relationship between return dispersion and the return on overall market is linear and positive. This is due to the fact that individual reactions to the market should be different to reflect their own different beliefs in the rational markets. In other words, the return dispersion among stock should increase as the absolute value of market return increases. However, during the period of high market stress with extreme market movement, it is predicted that market participants are more likely to herd around the market consensus due to psychological reasons. If herding behavior exists during the periods of high market volatility, the linear incremental correlation between return dispersion and market return should vanish. In other words, individual security return should deviate from the absolute value of market returns if herding behavior exists. The dispersion among stock returns should decrease or increase but at a declining rate to reflect investors' conformity to market consensus. Adopting Chiang and Zheng (2010)'s model, this hypothesis can be tested by using the following regression equation:

$$CSAD_t = \gamma_0 + \gamma_1 R_{m.t} + \gamma_2 \left| R_{m,t} \right| + \gamma_3 R_{m,t}^2 + \varepsilon_t \quad \text{……(2)}$$

where $R_{m,t}$ is the return on market portfolio at time *t*. The $R_{m,t}^2$ term is used to capture investors' herding behavior. $\gamma_{0,}, \gamma_1, \gamma_2,$ and γ_3 are regression coefficients and ε_t refers to the error terms. If rational assets pricing model holds true, the coefficient value of γ_2 should be positive and the coefficient value of γ_3 nonlinear term should be insignificant. If investors tend to herd during a significant move in the market, there will be a greater directional toward similar assets selection across the portfolio, leading toward lower return dispersions. Therefore, it is expected that the relationship between security return dispersion and market returns is nonlinear and negative when investors herd. In other words, γ_3 should be negative. According to Chiang and Zheng (2010), the value of $\gamma_1 + \gamma_2$ indicates the relationship between return dispersion and market return when $R_{m.t} > 0$, while the $\gamma_2 - \gamma_1$ show the relationship when $R_{m.t} < 0.$ Therefore, the ratio of $(\gamma_1 + \gamma_2)/(\gamma_2 - \gamma_1)$ provides the information as to the relative amount of asymmetry between stock return dispersion and the market's return.

Empirical Result:

Table 3 reports the results of herding activities by estimating the relationship between the cross-sectional absolute deviation of returns and the nonlinear market returns from Equation 2 by the ordinary least square. The estimated values of coefficients γ_3 are negative and significant at the 1% level for all the sectors in Thailand, with the exception of the telecommunication. This indicates that the herding behavior is present in all sectors in Thailand, namely consumer discretionary, consumer staples, energy, finance, healthcare, industrial, infotech, materials, and utilities. However, the magnitudes of the herding activities do vary from one sector to another depending on the magnitude of the coefficients. The two sectors that exhibit the least herding magnitude are the utilities and energy with the coefficients of -1.00 and -1.08 respectively. Industrial and healthcare sectors show the largest herding magnitude when the overall market makes a significant move, with the coefficients of -2.44 and -2.88, respectively. There is no evidence of the herding activities for securities in the telecommunication sector, with the negative but insignificant coefficients of -0.31.

Table 3
Estimates Coefficients of the CSAD for Each Sector Portfolio on the SET Market Return

	Sectors	Constant	Coefficient R_{mt}	Coefficient $\|R_{m,t}\|$	Coefficients $\|R^2_{m,t}\|$
	$CSAD_t = \gamma_0 + \gamma_1 R_{m,t} + \gamma_2 \|R_{m,t}\| + \gamma_3 R^2_{m,t} + \varepsilon_t$				
1	Consumer Discretinary	0.0236***	0.0059	0.3311***	-1.7417***
		(0.0000)	(0.5806)	(0.0000)	(0.0000)
2	Consumer Staples	0.0203***	-0.0288**	0.3338***	-1.3987***
		(0.0000)	(0.0135)	(0.0000)	(0.0006)
3	Energy	0.0180***	-0.0092	0.2029***	-1.0832**
		(0.0000)	(0.4431)	(0.0000)	(0.0151)
4	Healthcare	0.0206***	-0.0424*	0.3864***	-2.4489***
		(0.0000)	(0.0577)	(0.0000)	(0.0017)
5	Industrial	0.0259	-0.0191	0.3901***	-2.8776***
		(0.0000)	(0.1646)	(0.0000)	(0.0000)
6	Financial	0.0022***	0.0039	0.3377***	-1.9966***
		(0.0000)	(0.7515)	(0.0000)	(0.0000)
7	Infotech	0.0023***	0.0215	0.2212***	-1.3201**
		(0.0000)	(0.1255)	(0.0000)	(0.0119)
8	Materials	0.0025***	-0.0071	0.4013***	-2.2871***
		(0.0000)	(0.6094)	(0.0000)	(0.0000)
9	Telecommunications	0.0016***	-0.0014	0.1493***	-0.3142
		(0.0000)	(0.8985)	(0.0000)	(0.4348)
10	Utilities	0.0018***	0.0036	0.1217***	-1.0044*
		(0.0000)	(0.8985)	(0.0033)	(0.0086)

Research Question 2: Do investors in Thailand herd during extreme market conditions?

The herding effect during extreme market conditions is further examined by specifying the extreme up (down) market as 1%, 5%, and 10% criteria of the upper and lower tail of market return distributions. Therefore, the herding effect can be investigated via the following regression,

$$CSAD_t = \gamma_0 + \gamma_1 D^{Extreme}\left|R_{m,t}\right| + \gamma_2 (1 - D^{Extreme})\left|R_{m,t}\right| + \gamma_3 D^{Extreme} R^2_{m,t} + \gamma_4 (1 - D^{Extreme}) R^2_{m,t} + \varepsilon_t .$$

where $D^{Extreme}$ is a dummy variable that takes the value 1 when the market return on day *t* lies in the extreme higher or lower tail distributions and 0 otherwise.

Empirical Results:

Table 4 reports the empirical results of herding activities when the overall Thai equity market experiences an extreme movement of negative or positive returns. The extreme movement of the market was determined as the biggest negative returns and positive returns at the 1% of the lower and upper tail of the market return distribution. The overall market returns were sorted from the smallest to the largest and the observations that lie in the 1% of the upper and lower tail were used as an indicator of extreme market movement. If investors do herd during the extreme market movement, the cross-sectional absolute deviation from the market return should be small. In other words, the estimated values of coefficients, γ_3 should be negative. As shown in Table 4, the coefficient values of γ_3 are significant and negative for all the ten sectors. The magnitude of the coefficients is quite large and they are statistically significant at the 1% level. This suggests evidence of strong herding activities among investors in Thailand in all sectors when market experiences an extreme movement. Portfolios of stock in utilities and healthcare exhibit the strongest herding activities in response to a significant move in the market, with the coefficient values of -468.70 and -222.44, respectively. However, half of the ten sectors also exhibit negative and significant coefficients on the γ_4, suggesting for the presence of herding behavior under the normal tranquil periods. These five sectors are consumer discretionary, healthcare, industrial, financial, and materials. It is interesting to note that the magnitude of herding behavior of these five sectors is much more smaller during periods of the normal market movement than the extreme market, suggesting that herding activities are more pronounced when overall market moves in the extreme negative or positive direction.

Table 4
Esimates Coefficients of the CSAD for the Stocks Each Sector Portfolio on the Overall Market Return During the Extreme Market

	Sectors	Constant	Coefficient $D^{Extreme} \mid R_{m,t} \mid$	Coefficient $(1-D^{Extreme}) \mid R_{m,t} \mid$	Coefficients $D^{Extreme} R_{m,t}^2$	Coefficeint $(1-D^{Extreme}) R_{m,t}^2$
$CSAD_t = \gamma_0 + \gamma_1 D^{Extreme} \lvert R_{m,t} \rvert + \gamma_2 (1-D^{Extreme}) \lvert R_{m,t} \rvert + \gamma_3 D^{Extreme} R_{m,t}^2 + \gamma_4 (1-D^{Extreme}) R_{m,t}^2 + \varepsilon_t.$						
1	Consumer Discretinary	0.0237	2.7817	0.2538	-45.0319***	-0.9665**
		(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0116)
2	Consumer Staples	0.0206***	2.3127***	0.2549***	-21.3254***	-0.5563
		(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.1621)
3	Energy	0.0181***	4.2814***	0.1419***	-91.1116***	-0.6469
		(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.1235)
4	Healthcare	0.0222***	8.8054***	0.1125**	-222.4405***	-1.3656***
		(0.0000)	(0.0000)	(0.0150)	(0.0000)	(0.0471)
5	Industrial	0.0264***	3.2814***	0.2627***	-41.9967***	-1.4310***
		(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0039)
6	Financial	0.0225***	2.6012***	0.2510***	-26.8482***	-1.1822***
		(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0072)
7	Infotech	0.0230***	3.9061***	0.1234***	-53.7689***	-0.3372
		(0.0000)	(0.0000)	(0.0002)	(0.0000)	(0.4936)
8	Materials	0.0247***	3.6218***	0.3234***	-53.9838***	-1.0505**
		(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0348)
9	Telecommunications	0.0161***	2.4600***	0.1052***	-39.3862***	-0.0906
		(0.0000)	(0.0000)	(0.0001)	(0.0000)	(0.8176)
10	Utilities	0.0179***	11.6346***	0.0125	-468.7061***	-0.0467
		(0.0000)	(0.0000)	(0.7508)	(0.0000)	(0.9239)

To further test the null hypothesis that the coefficients of herding are equal during the normal and extreme market movement, the Wald Tests of equal coefficients are performed and the results are reported in Table 5. The null hypothesis of equal herding activities between the normal and extreme market movement is rejected for all the sectors at the 1% significance level. This confirms the finding of asymmetric herding behavior of investors particularly in the consumer discretionary, healthcare, industrial, financial, and materials, where stronger herding activities are in evidence during the extreme market movement than the normal periods.

Table 5
The Wald Tests of the Difference in Esimated Coefficients of Herding Between the Extreme Market and Normal Market Movement

	Sectors	Coefficients $D^{Extreme}R^2_{m,t}$	Coefficeint $(1-D^{Extreme})R^2_{m,t}$	Difference in Coefficient	F-Statistic	P-Value
1	Consumer Discretinary	-45.0319***	-0.9665**	-44.0652***	175.1900	(0.0000)
		(0.0000)	(0.0116)		(1, 5015)	
2	Consumer Staples	-21.3254***	-0.5563	-20.7691***	117.5419	(0.0000)
		(0.0000)	(0.1621)		(1, 5015)	
3	Energy	-91.1116***	-0.6469	-90.4648***	220.7151	(0.0000)
		(0.0000)	(0.1235)		(1, 4897)	
4	Healthcare	-222.4405***	-1.3656***	-221.0749***	132.7746	(0.0000)
		(0.0000)	(0.0471)		(1, 4425)	
5	Industrial	-41.9967***	-1.4310***	-40.5657***	105.8479	(0.0000)
		(0.0000)	(0.0039)		(1, 5015)	
6	Financial	-26.8482***	-1.1822***	-25.6659***	152,8585	(0.0000)
		(0.0000)	(0.0072)		(1, 5015)	
7	Infotech	-53.7689***	-0.3372	-53.4317***	273.1791	(0.0000)
		(0.0000)	(0.4936)		(1, 5015)	
8	Materials	-53.9838***	-1.0505**	-52.9332***	88.5192	(0.0000)
		(0.0000)	(0.0348)		(1, 5014)	
9	Telecommunications	-39.3862***	-0.0906	-39.2755***	85.5557	(0.0000)
		(0.0000)	(0.8176)		(1, 4842)	
10	Utilities	-468.7061***	-0.0467	-468.6594***	305.1362	(0.0000)
		(0.0000)	(0.9239)		(1, 3109)	

Research Question 3: Do investors in Thailand exhibit asymmetric pattern in herding behavior during Up and Down Market?

There are plethora empirical studies that demonstrate the asymmetric behavior of asset returns (Ball and Kothari, 1989; Conrad et al., 1991; and Bekaert and Wu, 2000). According to Chang et al. (2000), the direction of market return may affect investors' behavior differently. It is, therefore, worth investigating how investors react differently on the day the market is up vis-à-vis days when the market is down. It is expected that investors' herding behavior are asymmetric during market rises or falls. Additionally, it is also expected that herding effect will be more pronounced when the market is bearish as investors are more concerned about the losses and attempt to follow market consensus to avoid the displeasure of losing. These hypotheses can be tested by using the following regression equation:

$$CSAD_t = \gamma_0 + \gamma_1(1-D_t)R_{m,t} + \gamma_2 D_t R_{m,t} + \gamma_3(1-D_t)R^2_{m,t} + \gamma_4 D_t R^2_{m,t} + \varepsilon_t \quad \ldots\ldots(3)$$

where $D_t = 1$ when portfolio return is negative and 0 otherwise. The existence of herding effect during up market and down market can be identified through the significant negative value of coefficients γ_3 and γ_4. In addition if the herding effect as measured by return dispersion is more pronounced during the period when market is bearish as opposed to the up market, the coefficient values of $\gamma_4 > \gamma_3$.

Empirical Results

Table 6 reports the results of the herding activities of each sector during the bullish and bearish markets. The coefficient estimates of γ_3 were significant and negative during the bearish and bullish markets for four sectors including consumer discretionary (-1.6082 vs. -1.7595), energy (-1.2613 vs. -1.1189), health care (-1.3473 vs. -3.1124), and financial (-1.9625 vs. -2.6447). This indicates that investors herd when overall market went up and down in these four sectors. In addition, the coefficient estimates of $\gamma_4 > \gamma_3$ is larger during the bullish markets in all four sectors, except for the energy. The larger magnitude of coefficient in up market points to possible stronger herding activities during the bullish market for consumer discretionary, healthcare, and financial sectors. Investors in the consumer staples and infotech sectors tend to herd only when the market experienced a downturn with significant negative coefficients, γ_3 of -1.0510 and -1.2047, respectively. There was no evidence of herding activities of the market participants in utilities, communications, industrials, and materials sectors in either bearish or bullish periods.

Table 6
Esimates Coefficients of the CSAD for the Stocks Each Sector Portfolio on the Overall Market Return During Up and Down Market

	Sectors	Constant	Coefficient $D \mid R_{m,t} \mid$	Coefficient $(1-D) \mid R_{m,t} \mid$	Coefficients $DR_{m,t}^2$	Coefficeint $(1-D)R_{m,t}^2$
$CSAD_t = \gamma_0 + \gamma_1 D \mid R_{m,t} \mid + \gamma_2 (1-D) \mid R_{m,t} \mid + \gamma_3 DR_{m,t}^2 + \gamma_4 (1-D) R_{m,t}^2 + \varepsilon_t$						
1	Consumer Discretionary	0.0237***	0.3189***	0.3363***	-1.6082***	-1.7595***
		(0.0000)	(0.0000)	(0.0000)	(0.0007)	(0.0041)
2	Consumer Staples	0.0205***	0.3303***	0.0367***	-1.0510**	-0.5762
		(0.0000)	(0.0000)	(0.0000)	(0.0251)	(0.3963)
3	Energy	0.0182***	0.1768***	0.2011***	-1.2613**	-1.1189*
		(0.0000)	(0.0000)	(0.0000)	(0.0220)	(0.0764)
4	Healthcare	0.0221***	0.1286**	0.2258***	-1.3473*	-3.1124***
		(0.0000)	(0.0168)	(0.0004)	(0.0985)	(0.0073)
5	Industrial	0.0223***	0.0262	0.1118***	0.0501	-1.3348
		(0.0000)	(0.3126)	(0.0012)	(0.8827)	(0.1093)
6	Financial	0.0220***	0.3564***	0.3586***	-1.9625***	-2.6447***
		(0.0000)	(0.0000)	(0.0000)	(0.0001)	(0.0052)
7	Infotech	0.0228***	0.2226***	0.2027***	-1.2047*	-0.8137
		(0.0000)	(0.0000)	(0.0000)	(0.0602)	(0.2860)
8	Materials	0.0205***	0.0693***	0.0968***	-0.0619	-0.2647
		(0.0000)	(0.0072)	(0.0028)	(0.8413)	(0.6914)
9	Telecommunications	0.0157***	0.0591***	0.0969***	0.0080	-0.6053
		(0.0000)	(0.0697)	(0.0120)	(0.9860)	(0.4193)
10	Utilities	0.0183***	0.0167	0.0724	-0.0948	-0.9770
		(0.0000)	(0.7364)	(0.2390)	(0.8816)	(0.4625)

Where D = 1 if the market return is negative and D = 0 if the market return is positive.

We further test whether herding behavior is asymmetric between upturn and downturn in the overall market. Table 7 reports the Wald test on equal coefficients on herding activities during up and down market. The null hypothesis of equal magnitude on herding behavior in the up and down market cannot be rejected at the traditional significance level for any of the sectors under investigation. The evidence reported here suggests that there is no asymmetric herding behavior on the part of market participants during the up and down markets.

Table 7
The Wald Tests of the Difference in Esimated Coefficients of Herding Between the Up and Down Market

	Sectors	Coefficients $DR_{m,t}^2$	Coefficients $(1-D)R_{m,t}^2$	Difference in Coefficients	F-Statistic	P-Value
1	Consumer Discretinary	-1.6082***	-1.7595***	0.1513	0.0458	(0.0000)
		(0.0007)	(0.0041)		(1, 4875)	
2	Consumer Staples	-1.0510**	-0.5762	-0.4748	0.3954	(0.5295)
		(0.0251)	(0.3963)		(1, 4864)	
3	Energy	-1.2613**	-1.1189*	-0.1424	0.0346	(0.8524)
		(0.0220)	(0.0764)		(1, 4897)	
4	Healthcare	-1.3473*	-3.1124***	1.765	1.8334	(0.1758)
		(0.0985)	(0.0073)		(1, 4327)	
5	Industrial	0.0501	-1.3348	1.3849	2.6333	(0.1048)
		(0.8827)	(0.1093)		(1, 5015)	
6	Financial	-1.9625***	-2.6447***	0.6822	0.4727	(0.4918)
		(0.0001)	(0.0052)		(1, 4902)	
7	Infotech	-1.2047*	-0.8137	-0.3910	0.1844	(0.6677)
		(0.0602)	(0.2860)		(1, 4866)	
8	Materials	-0.0619	-0.2647	0.2028	0.0866	(0.7686)
		(0.8413)	(0.6914)		(1, 2165)	
9	Telecommunications	0.0080	-0.6053	0.6133	0.5641	(0.4527)
		(0.9860)	(0.4193)		(1, 3355)	
10	Utilities	-0.0948	-0.9770	0.8822	0.4088	(0.5226)
		(0.8816)	(0.4625)		(1, 2789)	

Research Question 4: Do investors in Thailand exhibit asymmetric pattern in herding behavior during the period of excess volatility in stock returns?

Literature in behaviorial finance has documented the influence of excessive stock market volatility on investors' psychology when conducting the trades (Gleason et. al; 2004 and Tan et. al; 2008). Investors are more likely to exhibit different herding dynamics during the times of high and low volatility. It is expected that investors tend to disregard their own private information and follow general market consensus blindly during the period characterized by high volatile market, therefore, herding effect should be more pronounced when the market is more volatile.

$$CSAD_t = \gamma_0 + \gamma_1 D^{HVol}\left|R_{m,t}\right| + \gamma_2(1-D^{HVol})\left|R_{m,t}\right| + \gamma_3 D^{HVol}R_{m,t}^2 + \gamma_4(1-D^{HVol})R_{m,t}^2 + \varepsilon_t. \quad \text{.....(4)}$$

Where D^{HVol} is a dummy variable that takes the value 1 when the stock market experiences an excessive volatility and 0 otherwise. Following Ouarda et al. (2013)'s study, if the stock market is characterized by excessive volatility, the current period volatility should exceed the weighted average six month volatility of stock markets preceding the study period and vice versa. Alternatively, we classify the trading volatility as high (low) if the trading volatility on day t is greater (less) than the previous 30-day moving average of the standard deviation of trading volume. If the herding effect is established, the value of coefficients γ_3 and γ_4 should be negative. If market participants tend to exhibit more strong effect toward herding during the period of excessive volatility, the $\gamma_4 > \gamma_3$.

Research Question 5: Is the herding behavior in Thailand more pronounced during the period of high transaction volumes?

An old Wall Street adage stated that "It takes trading volume to make market prices moves." (Chen, Firth, and Rui, 2001). High trading or transaction volumes are often used as an indicator of the activities level of market participants in response to the abnormal or unusual flow of information. Therefore, information available to the market has some influences on the investors' behavior and the size of trading volume (Pati, 2008). By the same token, the herding activities by a group of investor pushing stock prices to deviate away from the fundamental value can cause an excessive trading volume and volatility in the stock markets (Bikhchandani et al., 1992; Nofsinger and Sias, 1999). Hence, there should be an association between herding behavior and trading volatility and volume. It is expected that investors in collective-oriented Thai and Turkish cultures tend to follow the actions of other when observing the majority of investors sharing similar market expectations and trade more actively. Thus, greater herding behavior will be observed during the period of high trading volume. To test the effect of trading volume on the herding behavior, we perform the following ordinary least square regression:

$$CSAD_t = \gamma_0 + \gamma_1 D_t^{HVolume}\left|R_{m,t}\right| + \gamma_2(1-D_t^{HVolume})\left|R_{m,t}\right| + \gamma_3 D_t^{HVolume}R_{m,t}^2 + \gamma_4(1-D_t^{HVolume})R_{m,t}^2 + \varepsilon_t. \quad \text{.....(5)}$$

A dummy $D_t^{HVolume}$ variable is used to divide the data into two groups. $D_t^{HVolume}$ takes on the value of 1 during the period that is characterized by an excessive trading volume and 0 otherwise. The identical approach to determining the excessive trading volatility is employed to calculate the excessive trading volume. The period of high trading volume can be identified as a period where trading volume is greater than the weighted average 6-month trading volume preceding the study period and vice versa. We also implemented alternative measurement as an indicator of high trading volume. The trading volume is high if it is greater than the previous 30-day moving average trading volume and vice versa.

Research Question 6: Do the investors in Thailand herd during the periods of financial, natural, political, and global financial crisis?

Based on the intuition affirmed earlier, herding behavior is more likely to occur during the period of high market stress, which is normally defined as a period of extreme returns (Christie and Huang, 1995; Chang et. al., 2000). Recent evidence shows that extreme market movements occur when markets experienced crisis. During the crisis period, market is very volatile which reduces investors' confidence to a very low level. Therefore, it is reasonable to expect that greater herding behavior will be observed around the time of crisis, when uncertainty is high. The magnitude of herding behavior will vary depending on the types of crisis (financial, natural, political, and global financial crises), the severity, and persistence of the crisis. The crisis events we examined for both Thailand and Turkey are 1989 event, 1997 Asian financial crisis, 1996 Tsunami crisis, 1998 Russian crisis, 2000 Information technology bubble, 2001 September 11, 2003 SARS crisis, 2004 political crisis in Turkey, 2006 political crisis in Thailand, and 2008 global credit market crisis. We conducted several structural break tests to detect the breakpoints and divided the full periods according to the critical breakpoint. The effect of crises on herding behavior can be investigated through the following regression:

$$CSAD_t = \gamma_0 + \gamma_1 D_t^{Crisis}\left|R_{m,t}\right| + \gamma_2(1-D_t^{Crisis})\left|R_{m,t}\right| + \gamma_3 D^{Crisis}R_{m,t}^2 + \gamma_4(1-D^{Crisis})R_{m,t}^2 + \varepsilon_t \quad \text{.....(6)}$$

Where the dummy variable, D_t^{Crisis} is used to divide the data into two groups. D_t^{Crisis} takes on the value of 1 during the period that is characterized by a crisis event and 0 otherwise.

Crisis Events	Thailand
1	June 4, 1989 event
2	1997Asian Financial Crisis
3	1998 Russian Crisis
4	2000 Technology Bubble
5	2001 September 11
6	2004Tsunami Crisis
7	2006 Political Crisis in Thailand
8	2008 Mortgage Subprime Debt Crisis

Research Question 7: Do the major market microstructure change have any significant impact on investors' herding behavior in Thailand?

	Thailand
1st Sub-Period	Internet Trading Platforms were launched on November 13, 2000. January 1970 to December 2000
2nd Sub-Period	The Bond Electronic Exchange (BEX) was launched on November 26, 2003. January 2001 to December 2003
3rd Sub-Period	January 2004 to December 2014, The Future Exchange (TFEX) was established and trade the derivative for the first time on May 17, 2004.

Before testing for the presence of herding effect occurs during the major changes in these markets, I will also implement the Bai-Perron multiple breakpoints test, Chow's break point test and Chow's forecast test, and Quant-Andrews breakpoint tests to ensure that the three cutoff periods dictate a significant breakpoint for detecting herding behavior. Once the valid breakpoints are established, the herding effect will be conducted for the three aforementioned subperiods based on equation (2) as shown below.

$$CSAD_t = \gamma_0 + \gamma_1 R_{m.t} + \gamma_2 \left|R_{m,t}\right| + \gamma_3 R_{m,t}^2 + \varepsilon_t \quad \text{.....(7)}$$

If changes in the market microstructure affect the investors' behavior, γ_3 should be negative and significant for each of the three sub-periods.

Research Question 8: Are herding behavior among market participants in Thailand affected by fundamental factors?

Prior studies including Hwang and Salmon (2004) and Tan et al. (2008) find that fundamental factors at the firm and market level, namely dividend price ratio, risk-free rate, and term spread have some explanatory power on the herding activities and stock returns behavior. In this study, we also examined whether herding behaviors in Thailand and Turkey are driven by fundamental factors. We utilize the risk-free rate (RF) and the dividend price ratio (DPR) as proxies for fundamental factors for Thai and Turkish equity markets. In regards to systematic risk factors, we employ Fama-French (SMB, and HML), Carhart momentum (WML), and liquidity (LIQ) factors as proxies for systematic risk.

We construct the Fama and French factors, momentum, and liquidity factors as shown by Lam and Tam (2011). We use turnover ratio and Amihud's (2002) measure as proxies for the liquidity factors. The regressions are as follows:

$$CSAD_t = \gamma_0 + \gamma_1 R_{m.t} + \gamma_2 \left|R_{m,t}\right| + \gamma_3 R_{m,t}^2 + \gamma_4 (RF_t) + \gamma_5 (DPR_t) + \gamma_6 (SMB_t) + \gamma_7 (HML_t) + \gamma_8 (WML_t) + \gamma_9 (LIQ_t + \varepsilon_t \quad \text{.....(7)}$$

$$CSAD_t = \gamma_0 + \gamma_1 (1 - D_t) R_{m,t} + \gamma_2 D_t R_{m,t} + \gamma_3 D_t R_{m,t}^2 + \gamma_4 (1 - D_t) R_{m,t}^2 + \gamma_5 (RF_t) + \gamma_6 (DPR_t) + \gamma_7 (SMB_t) + \gamma_8 (HML_t) + \gamma_9 (WML_g) + \gamma_{10} (LIQ_t) + \varepsilon_t \quad \text{.....(8)}$$

Where RF_t is the risk-free interest rates, DPR_t represents the dividends payout ratio, SMB_t is the size factor, SMB_t represents book-to-market factor, WML_t is the momentum factors, LIQ_t is the liquidity factor, and ε_t is the error term with zero mean and zero correlation with all other explanatory variables. The formation of SMB and HML are constructed based on the Fama and French three factor models.

SMB which represents a size factor (small minus big) is the difference between the simple average of return on the small stock portfolio and the returns on the big stock portfolios:

$$SMB = \frac{(S/L - B/L) + (S/M - B/M) + (S/H - B/H)}{3} \quad \text{.....(9)}$$

Similarly, HML which represents the book-to-market factor (high minus low) is the difference between the simple average return on the high book-to-market minus the returns on low-book-to market portfolios.

$$HML = \frac{(S/H - S/L) + (B/H - B/L)}{2} \quad \text{.....(10)}$$

We follow L'her et al. (2004) in constructing the momentum factor (WML). The momentum factor is the difference between the returns on winner portfolio and the returns on the loser portfolios.

$$WML = \frac{(S/W - S/L) + (B/W - B/L)}{2} \quad \text{.....(11)}$$

Research Question 9: Do the investors in these markets herd around macroeconomic announcements?

Several event studies examined the reactions of stock markets around local macroeconomic announcements and the impact of U.S. scheduled macroeconomic announcements on foreign markets and reported a high correlation (Belgacem, 2013; Rigobon and Sack, 2006; Dimpfel, 2001). If information content inherent in macroeconomic news affects stock market, it should also impact investors' behavior. It is reasonable to investigate the extent to which scheduled macroeconomic news impact investors' propensity to herd when facing similar decisions given all publicly available information including macroeconomic news.

Research Question 10: Does investors' herding behavior destabilize countries stock markets?

According to rational expectations theory, the presence of herding behavior will cause stock markets to deviate from their fundamental value as investors suppress their own belief but follow the market consensus when conducting trade. It is reasonable to expect that investors' herding behavior will destabilize countries stock market and cause market volatility to increase.

CONCLUSION

This research is to examine the existence of investors' herding behavior in Thailand and whether their collective trading behaviors destabilize the countries' stock markets. This study shows that the herding behavior is present in all sectors in Thailand, namely consumer discretionary, consumer staples, energy, finance, healthcare, industrial, infotech, materials, and utilities. The two sectors that exhibit the least herding magnitude are the utilities and energy. The Industrial and healthcare sectors show the largest herding magnitude. There is no evidence of the herding activities for securities in the telecommunication sector. Examining the herding activities when the overall Thai equity market experiences an extreme movement of negative or positive returns which is determined as the biggest negative returns and positive returns at the 1% of the lower and upper tail of the market return distribution shows strong herding activities among investors in Thailand. Portfolios of stock in utilities and healthcare exhibit the strongest herding activities in response to a significant move in the market. However, half of the ten sectors also exhibit the presence of herding behavior under the normal tranquil periods. These five sectors are consumer discretionary, healthcare, industrial, financial, and materials. It is interesting to note that the magnitude of herding behavior of these five sectors is much more smaller during periods of the normal market movement than the extreme market, suggesting that herding activities are more pronounced when overall market moves in the extreme negative or positive direction. The Wald Tests of equal herding activities between the normal and extreme market movement also confirm the finding of asymmetric herding behavior of investors during the extreme market movement than the normal periods. Further test of herding activities of each sector during the bullish and bearish market indicates that investors herd when overall market went up and down in consumer discretionary , energy, health care, and financial sectors. The larger magnitude of coefficient in up market points to possible stronger herding activities during the bullish market for consumer discretionary, healthcare, and financial sectors. Investors in the consumer staples and infotech sectors tend to herd only when the market experienced a downturn. There was no evidence of herding activities of the market participants in utilities, communications, industrials, and materials sectors in either bearish or bullish periods.

REFERENCES

Ahimud, Y. 2000. Liquidity and Stock Returns: Cross-Section and Time Series Effects.

Balcilar, M., Demirer, R., and Hammoudeh, S. 2013. Investor Herds and Regime Switching: Evidence from Gulf Arab Stock Markets. International Financial Markets Institutions and Money, 23, 295-321.

Barkoulas, J.T. and Travlos, N., 1998. Chaos in An Emerging Capital Market? The Case of Athens Stock Exchange, Applied Financial Economics, 8, 231-243.

Banerjee, A.V. 1992. A Simple Model of Herd Behavior. Quarterly Journal of Economics 107, 797-817.

Bekaert, G. and Harvey, C., 1997. Emerging Equity Market Volatility. Journal of Financial Economics, 43, 29-77.

Bikhchandani, S., Sharma, S., 2000. Herd Behavior in Financial Markets: A Review. IMF Working Paper WP/00/48 (International Monetary Fund, Washington).

Blasco, N., Corredor, P. and Ferreruela, F. 2012. Does Herding Affect Volatility? Implications for the Spanish Stock Market. Quantitative Finance 12(2), 311-327.

Bohl, M.T., Voronkova, S., 2005. Institutional Trader's Behavior in an Emerging Stock Market: Empirical Evidence on Polish Pension Fund Investors? Journal of Business Finance and Accounting 32 (7), 1537-1560.

Chang, E.C., Cheng, J.W., Knorana, A., 2000. An Examination of Herd Behavior in Equity Markets: An International Perspective. Journal of Banking and Finance 24 (10), 1651-1699.

Chang, C.H. and Lin, S.J. 2015. The Effects of National Culture and Behavioral Pitfalls on Investors' Decision-Making: Herding Behavior in International Stock Markets. International Review of Economics and Finance 37, 380-392.

Chen, G., Firth, M., and Rui, O., 2001. The Dynamic Relation between Stock Returns, Trading Volume, and Volatility. The Financial Review, 38, 153-174.

Chiang, T.C., Li, J., and Tan L., 2010. Empirical Investigation of Herding behavior in Chinese stock markets: Evidence from quantile regression analysis 21, 111-124.

Chiang, T.C. and Zheng, D., 2010. An Empirical Analysis of Herding Behavior in Global Stock Markets. Journal of Banking and Finance 34(8), 1911-1921.

Chow, C.W., Shields, M.D., and Chan, Y.K., 1991. The Effects of Management Controls and National Culture on Manufacturing Performance: An Experimental Investigation. Accounting, Organizations and Society, 16, 209-226.

Christie, W.G., Huang, R.D., 1995. Following the pied piper: do individual returns herd around the markets? Financial Analyst Journal 51 (4), 31-37.

Cote, I., Sanders., D., 1997. Herding Behavior: Explanations and Implications Behavioral Research in Accounting 9(1), 20-45.

Damarco, P.M., Kaniel R., and Kremer, I. 2004. Diversification as a Public Good: Community Effect in Portfolio Choice. Journal of Finance 59, 1677-1716.

Dass, N. Massa, M. and Patgiri, R. 2008. Mutual Funds and Bubbles: The Surprising Role of Contractual Incentives. Review of Financial Students 21, 51-99.

Demirer, R and Kutan, A.M., 2006. Does Herding Behavior Exist in Chinese Stock Markets? International Financial Markets, Institutions, and Money 16, 123-142.

Demire, R, Kutan, A.M., and Zhang, H. 2014. Do ADR Investors Herd? Evidence from Advanced and Emerging Market. International Review of Economics and Finance 30, 138-148.

Dennis, P.J. and Strickland, D., 2002. Who Blinks in Volatile Market, Individuals or Institutional? Journal of Finance 57(3), 1923-1949.

Devenow, A., and Welch, I., 1996. Rational Herding in Financial Economics. European Economic Review 40, 603-615

De Santis, G., and S. Imrohoroglu. 1997. Stock Returns and Volatility in Emerging Financial Markets. Journal of International Money and Finance 16 (4), 561-579.

Gleason, K.C., Mathur, I., and Peterson, M.A., 2004. Analysis of Intraday Herding Behavior Among the Sector ETFs. Journal of Empirical Finance 11, 681-694.

Grinblatt, M. Titman, S. Wermers, R., 1995. Momentum Investment Strategies, Portfolio Performance, and Herding: A Study of Mutual Fund Behavior. The American Economic Review 85(5), 1088-1105.

Hofstede, G., 2001. Culture's consequences: Comparing Values, Behaviors, Institutions, and Organizations Across nations (2nd ed.). California: Sage.

Hwang, S. and Salmon, M., 2004. Market Stress and Herding? Journal of Empirical Finance 11 (4), 585-616.

Hwang, S., Salmon, M., 2006. Sentiment and beta herding. Working paper, University of Warwick. Hsieh, S.F., 2013. Individual and Institutional Herding and the Impact on Stock Returns: Evidence from Taiwan Stock Market. International Review of Financial Analysis 29, 175-188.

Khan, H., Hassairi, S., and Viviani, J.L., 2011. Herd Behavior and Market Stress: The Case of Four European Countries. International Business Research 4(3), 53-67.

Lam, K.S.K. and Tam, H.K., 2011. Liquidity and Asset Pricing: Evidence from Hong Kong Stock Market. Journal of Banking and Finance 35, 2217-2230.

Lam, K.S.K., So, S.M.S., and Li, F.K., 2010. On the Validity of the Augmented Fama-French (1993) Four Factor Asset Pricing Model: Evidence from Hong Kong Stock Market. Review of Quantitative Finance and Accounting 35, 89-111.

Lam, K.S.K. and Z. Qiao, 2015. Herding and Fundamental Factors: The Hong Kong Experience. Pacific Basin Finance Journal 32, 160-188.

Lao, P. and H. Singh, 2011. Herding Behavior in the Chinese and Indian Stock Market, Journal of Asian Economics 22, 495-506.

Nofsinger, J., Sias, R., 1999. Herding and Feedback Trading by Institutional and Individual Investors. Journal of Finance 54(6), 2263-2295.

Patel, S. and Sarkar, A., 1998. Stock Markets in Developed and Emerging Markets, Research Paper No. 9809, Federal Reserve Bank of New York.

Pati, P.C., 2008. The Relationship between Price Volatility, Trading Volume and Market Depth: Evidence from an Emerging Indian Stock Index Futures Market. South Asian Journal of Management, 15, 25-47.

Schmeling, M. , 2009. Investor Sentiment and stock Returns: Some International Evidence. Journal of Empirical Finance 16, 394-408.

Scharfstein, D.S. and Stein, J.C., 1990. Herd Behavior and Investment. American Economic Review 80, 465-479.

Schfrin, H., 2007. Behavioral Corporation Finance: Decisions that Create Value. New York: McGraw-Hill.

Tan, L., Chiang, T.C., Mason, J., Nelling, E., 2008. Herding behavior in Chinese stock markets: An Examination of A and B shares. Pacific Basin Finance Journal 16, 61-77.

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Earnings management behaviors and stock price synchronicitys

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Abstract. The purpose of this study is to investigate whether accrual-based earnings management and real activity earning management could influence the stock market inefficiency. Furthermore, considering that the effect of industrial concentration on the earnings management behaviors and value relevance of earnings, we explore the impacts of the degrees of industrial concentration on the relation of these earnings managements and stock price synchronicity by the threshold model in this study. The empirical results show that there is a positive relation between accrual-based earnings management and stock price synchronicity, while there is a negative relation between real activity earning management and stock price synchronicity. Furthermore, we also find that the industry concentration indeed influences the relations between different earnings management behaviors and the stock price synchronicity. The results of this study not only to fill the gap of literatures, but also provide a new insight for the regulators in their regulation revision.

Keywords— Firm-Specific Information of Stock Prices, Accrual-Based Earnings Management, Real Activities Earnings Management, Capital Market Efficiency, Industry Concentration, Threshold Model.

INTRODUCTION

Theoretically, stock price variation reflects market-, industry-, and firm-level information. However, Roll (1988) finds in a market model regression that most changes in stock returns that cannot be explained by the variance in market returns or industry returns reflect firm-specific information. Subsequently, numerous studies have been conducted on the basis of Roll's argument. Morck, Yeung, and Yu (2000) propose the concept of stock price synchronicity from the perspective of information efficiency, using R2 to measure the synchronicity of stock prices. Morck et al. (2000) maintain that R2 accounts for the level of firm-specific information capitalized into stock prices, and find that when the amount of firm-specific information impounded in stock prices is low, the level of stock price synchronicity is high. Piotroski and Roulstone (2004) also show that market- and industry-specific information is associated with concurrent rises and falls in the prices of all stocks in a market or industry; this phenomenon refers to stock price synchronicity. However, firm-specific information decreases the sensitivity of stock prices toward market or industry volatility, thereby reducing the stock price synchronicity of firms. Because stock price synchronicity influences firms' financial activities, allocation of capital market resources, and economic policies, relevant topics have received growing attention among researchers in corporate financial management.

Accounting information provided in financial statements discloses firm-specific information, and earnings information is of particular interest to market investors. However, given the information asymmetry between firm managers and market investors, it is not possible for external financial statement users to ascertain whether a firm's announced earnings level reflects its actual operating performance or whether accounting figures have been altered through earnings management. Therefore, the discretionary behavior of earnings reporting provides a convenient means for exaggerating operating performance. If accounting information is significantly related to stock price, then this information is value relevant (Barth et al., 2001). Moreover, corporate stock prices have been empirically shown to reflect important earnings information; for investors, earnings information possesses value relevance (Ball and Brown, 1968). However, Francis and Schipper (1999) find that the relationship between earnings and stock returns decreases significantly by year. As such, if market inefficiency occurs and investors have functional fixedness toward earnings and fail to identify accounting choices implemented by firms, then earnings management may affect the value relevance of earnings information (Hunt, Moyer, and Shevlin, 1996; Marquardt and Wiedman, 2004). Specifically, earnings management may increase the value relevance of earnings information if earnings are manipulated to communicate specific information to external investors or lower the variance in earnings information (Sankar and Subramanyam, 2001); or it may reduce the value relevance of earnings information when earnings management attempts to exaggerate the earning amount, strengthen the influence of external factors, or generate erroneous reports (Marquardt and Wiedman, 2004). Earnings management can therefore be assumed to affect the value relevance of earnings information, which subsequently affects stock price synchronicity.

Earnings information comprises the incremental information content of accruals and cash flows, which allow for adjustment of earnings levels through accrual-based and real earnings management (Schipper, 1989; Jones, 1991; Dechow, Sloan, and Sweeney, 1995; Roychowdhury, 2006; Cohen et al., 2008; Cohen et al., 2010; Cohen and Zarowin, 2010) in order to transmit or withhold firm-specific information. Moreover, studies on earnings management have suggested that accounting choices are typically used to adjust accruals to change the earnings level, but such choices have a nonsignificant effect on cash flow from operating activities (CFO). In contrast to accrual-based earnings management, real earnings management affects both accruals and CFO, and subsequently, the earnings level. Accordingly, different earnings management approaches differ in the extent of their influence on both the value relevance of earnings and the earnings level. The effects of accrual-based earnings management on the value relevance of accounting information have been extensively studied (e.g., Sankar and Subramanyam, 2001; Guay, Kothari, and Watts, 1996); however, the relationships between earnings management approaches and stock price synchronicity are relatively less well understood. This literature gap underlies the first objective of the present study: to use stock price synchronicity (Morck, Yeung, and Zarowin, 2003) as a proxy variable for the amount of firm-specific information embedded in stock prices to ascertain whether earnings management approaches cause concurrent rises and falls in stock prices in relation to market and industry volatility.

In general, investors take timely notice of the implications of changes in legal regulations or competitive environments for a firm. Such implications can be observed in the stock price of the firm; when transactions are conducted, they can also be reflected by the content of financial statements (Lev and Zarowin, 1999). Thus, stock prices not only represent essential information about corporate operations but are aligned with the trading activity of risk arbitrageurs who gather and handle private information (French and Roll, 1986; Roll, 1988). Moreover, the level of competition varies across industries; hence, the announcement of earnings quality is typically based on the industry environment in which a firm operates. Specifically, in firms that operate in a highly competitive industry, managers tend to implement earnings management to gain favor with investors (Hagerman and Zmijewski, 1979, 1981), thereby conveying or hiding private information to affect the value relevance of earnings information (Harris, 1998). Many researchers have discussed the relationship between industry competition level and earnings management (e.g., Amir and Lev, 1996; Francis and Schipper, 1999; Lev and Zarowin, 1999; Durnev, Morck and Yeung, 2001; Hou and Robinson, 2006; Tinaikar and Xue, 2009). Few studies, however, have explored the relationships between industry competition level, earnings management, and stock price synchronicity. Thus, the present study adopts a threshold model to examine the effects of industry competition level on the relationship between earnings management and stock price synchronicity.

The empirical findings of this study are summarized as follows. First, when the earnings level is adjusted by increasing and decreasing accrued revenues or expenses, discretionary accruals (DAs) only increase the interference of earnings (Guay et al., 1996), rendering earnings information irrelevant to current stock returns and reducing the correlation between the corporate stock price and firm-specific information, which indicates that the stock price contains less firm-specific information. Second, real earnings management correlates significantly and negatively with stock price synchronicity, suggesting that stock price synchronicity decreases when a timeline for making an investment or financial plan is determined with the intent of altering reported earnings or the items thereof. Third, the threshold model shows that the managers of firms in relatively less concentrated industries and with higher supernormal profits tend to implement accrual-based earnings management to safeguard their firm-specific information from access by competitors, thereby causing stock price synchronicity. By contrast, the managers of firms in relatively more concentrated industries tend to implement real earnings management to gain favor with their investors. This allows the firms' private information to be conveyed and their stock prices to contain firm-specific information accordingly.

The remainder of this paper is structured as follows. Section 2 focuses on the literature review and hypothesis development. Section 3 introduces the methodology, which comprises the sampling, variables, and an empirical model used in this study. The empirical results are presented in Section 4, and, finally, Section 5 provides the conclusions to this study.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Corporate stock price indicates a firm's earnings performance (Ball and Brown, 1968). Therefore, investors perceive earnings as value relevant. Earnings comprise accruals and cash flows, which allow for adjusting the earnings level through accrual-based and real earnings management to present a positive view of a firm's operating performance. Studies into earnings management have argued that when the earnings level is adjusted by increasing and decreasing accrued revenues or expenses, the effects of earnings management on CFO are nonsignificant. However, in contrast to accrual-based earnings management, real earnings management affects both accruals and CFO, altering the information disclosed by earnings. Further, if investors have functional fixedness toward earnings and fail to identify accounting choices implemented by firms, then earnings management may affect the value relevance of earnings information (Hunt et al. 1996; Marquardt and Wiedman, 2004). It is universally acknowledged across the capital market that DAs are value relevant, probably because firm managers use accounting judgments to make the earnings level a more precise indicator of firm value (Subramanyam, 1996). However, if DAs increase only the interference of earnings, earnings become irrelevant to the current stock return (Guay et al., 1996). Chen et al. (2012) note that because real earnings management alters reported earnings or the items thereof on the basis of selective timelines for making investments or financial plans (Roychowdhury, 2006; Gupta, Pevzner and Seethamraju. 2010), this approach can be concealed in daily operating activities and has no effect on audit opinion or prompt government investigation (Gupta et al., 2010), which may otherwise draw attention from market participants (Roychowdhury, 2006; Cohen et al., 2008; Chen, Chou, Chen, and Lin, 2013). As such, considerable real earnings management may result in irrational investor reactions. In other words, the more earnings management there is, the less relevant reported and actual earnings will be and the less reliable earnings information will be; this weakens investor confidence in the information, reducing its value relevance and invalidating the association between firm-specific information and stock price (Healy and Wahlen, 1999). In summary, given the information asymmetry between firm managers and investors, earnings management reduces the value relevance of earnings information; consequently, corporate stock prices reflect only market- and industry-specific information, resulting in stock price synchronicity. H1 is formulated accordingly:

H1: Different earnings management approaches differ in the extent to which they affect stock price synchronicity.

In general, investors take timely notice of the implications of changes in legal regulations or competitive environments for a firm. Such implications can be observed in the stock price of the firm; when transactions are conducted, the implications are also reflected by the content of financial statements (Lev and Zarowin, 1999). Thus, stock prices not only represent essential information about corporate operation but are aligned with the trading activity of risk arbitrageurs who gather and handle private information (French and Roll, 1986; Roll, 1988). Moreover, the announcement of earnings quality is typically based on the industry environment in which a firm operates. For example, firms in dynamic industry environments have lower usefulness of earnings than do those in less dynamic industry environments (Lev and Zarowin, 1999). The value relevance of financial information of high-tech firms is lower than that of low-tech firms (Amir and Lev, 1996; Francis and Schipper, 1999). Furthermore, the managers of firms in more competitive industries are more likely to implement earnings management to gain favor with investors and convey or conceal the firms' private information, an act

that subsequently affects the value relevance of their earnings information. Tinaikar and Xue (2009) show that market competition correlates positively with the degree of earnings management. Hagerman and Zmijewski (1979, 1981) and Harris (1998) have observed that firms in low-competition industries and with high supernormal profits tend to safeguard their firm-specific information from access by competitors. Amir and Lev (1996) find that when both financial and nonfinancial information are combined, the explanatory power of accounting earnings (financial information) and the number of mobile phone subscribers and market share (nonfinancial information) over the corporate stock price increases. As such, industry competition level affects both the value relevance of earnings information and the synchronicity of stock prices. H2 is formulated accordingly:

H2: Different levels of industry competition differ in the extent to which they influence the relationship between earnings management and stock price synchronicity.

METHOD

Sample and data source

The present study investigates a sample of listed firms in the United States over the 2000–2010 period. The variables of financial information are from Compustat. Sampled firms in financial and regulated industries are excluded because their financial statements and industry characteristics are distinct from those of firms in other industries.

Empirical model and variable definition

Assessing how industry competitiveness affects the relationship between earning management behavior and stock price synchronicity, this study first tests H1 by using the following regression models.

$$SYNCH_{i,t} = \alpha_0 + \alpha_1 DA_{i,t} + \sum \alpha_j Control_{i,t} + \varepsilon_{it} \quad (1)$$

$$SYNCH_{i,t} = \beta_0 + \beta_1 RM_{i,t} + \sum \beta_j Control_{i,t} + \varepsilon_{it} \quad (2)$$

If the sampled firms are divided into different groups according to a specific value, crucial information might be omitted and sampling bias might occur. Therefore, the threshold variables of the sampled data are used to determine various dividing points and derive appropriate threshold values. This enables addressing the shortcomings of subjective categorization. Panel threshold regression (Hansen, 1999) is adopted to establish the following empirical model in order to analyze the effects of industry competition level on the relationship between earnings management and stock price synchronicity:

$$SYNCH_{i,t} = \alpha_0 + \alpha_1^L DA_{i,t} \times I\left(HHI_{i,t-1} \le \gamma\right) + \alpha_1^H DA_{i,t} \times I\left(HHI_{i,t-1} > \gamma\right) + \sum \alpha_j Control_{i,t} + \varepsilon_{it} \quad (3)$$

$$SYNCH_{i,t} = \beta_0 + \beta_1^L RM_{i,t} \times I\left(HHI_{i,t-1} \le \gamma\right) + \beta_1^H RM_{i,t} \times I\left(HHI_{i,t-1} > \gamma\right) + \sum \beta_j Control_{i,t} + \varepsilon_{it} \quad (4)$$

where α_1^L and α_1^H denote the effects of earnings management on stock price synchronicity at different levels of industry competition; $I(HHI)$ is an indicator function; *HHI* is the threshold variable; and γ is a specific threshold value at which the sampled firms are divided into high and low industry concentration groups. If *HHI* > γ, then $I(HHI)$ = 1 (otherwise, 0). Variables in the model are detailed as follows:

(1) Stock price synchronicity (SYNCH)

Stock price synchronicity refers to the phenomenon of stock prices rising and falling with the market price in a given period. Roll (1988) is first to use R^2 as a proxy variable for stock price synchronicity to calculate the amount of firm-specific information impounded in stock price. When stock price changes reflect increases in the amount of firm-specific information, R^2 decreases, indicating decreased stock price synchronicity. Durnev et al. (2003) report that stocks with a lower R^2 contain more future earnings information, a finding that supports the use of stock price synchronicity as a proxy variable for the amount of firm-specific information embedded in stock prices. Accordingly, the present study uses the empirical model of Durnev et al. (2003) to measure the synchronicity R^2 of individual stocks:

$$r_{i,t} = \alpha_i + \beta_1 r_{m,t} + \beta_2 r_{I,t} + \varepsilon_{it} \quad (5)$$

where $r_{i,t}$ is the return of stock *i* in the week *t*; $r_{m,t}$ is the market return in the week *t*; $r_{I,t}$ is the value-weighted return of industry *I* in week *t*. Consistent with Piotroski and Roulstone (2004), R^2 is defined as follows:

$$SYNCH_{i,t} = \ln\left(\frac{R^2}{1-R^2}\right) \quad (6)$$

where R^2 is the coefficient of determination derived from Eq. (5). The finite variable of 0–1 is transformed through a natural logarithm into a continuous variable so that the distribution of dependent variables is closer to a normal distribution. With this approach, the annual stock price synchronicity of each sampled firm can be measured. Piotroski and Roulstone (2004) define R^2 as the explanatory power of market- and industry-level returns over the variance of stock returns of individual firms, and they use the variable to compare the effects of firm-specific, industry-level, and market-level information on stock prices. The results show that the more synchronous a stock price is, the more market- and industry-level information it reflects and the less firm-specific information it contains.

(2) Earnings management

Discretionary accrual-based earnings management

On the basis of the empirical findings of Dechow et al. (1995), the modified Jones model is used to detect the behavior of earnings management. The model is expressed as follows:

$$\frac{TA_t}{Asset_{t-1}} = \gamma_1 \frac{1}{Asset_{t-1}} + \gamma_2 \frac{\Delta REV_t}{Asset_{t-1}} + \gamma_3 \frac{PPE_t}{Asset_{t-1}} + \varepsilon_t \quad (7)$$

$$\frac{NDA_t}{Asset_{t-1}} = \hat{\gamma}_1 \frac{1}{Asset_{t-1}} + \hat{\gamma}_2 \frac{\left(\Delta REV_t - \Delta AR_t\right)}{Asset_{t-1}} + \hat{\gamma}_3 \frac{PPE_t}{Asset_{t-1}} \quad (8)$$

$$DA_t = \left(\frac{TA_{i,t}}{Assets_{i,t-1}}\right) - \left(\frac{NDA_{i,t}}{Assets_{i,t-1}}\right) \quad (9)$$

where TA is the total accruals; ΔREV is the difference in earnings between year t and the year $t-1$; PPE is the total asset (e.g., property, plant machinery, and equipment); ΔAR is the difference in accounts receivable between year t and year $t-1$; NDA is nondiscretionary accruals; DA is discretionary accruals; and $Asset$ is the total assets.

Real earnings management (REM)

Consistent with Roychowdhury (2006), Eqs. (10)–(15) are used to develop three proxy variables for the level of real earnings management (*REM*): abnormal operating cash flow (*R_CFO*), abnormal discretionary expense (*R_DISCEXP*), and abnormal production cost (*R_PROD*).

$$\frac{CFO_{it}}{Assets_{i,t\text{-}1}} = \alpha_1 \frac{1}{Assets_{i,t-1}} + \alpha_2 \frac{Sales_{it}}{Assets_{i,t-1}} + \alpha_3 \frac{\Delta Sales_{it}}{Assets_{i,t-1}} + \varepsilon_{it} \quad (10)$$

where *CFO* is the operating cash flow; *Assets* is the total asset; *Sales* is the proceeds of sales; and $\Delta Sales$ is the variation of sales proceeds. Abnormal operating cash flow is obtained by subtracting the normal operating cash flow derived from Eq. (10) from the actual operating cash flow. Eqs. (12) and (13) are combined into Eq. (14) to estimate the normal production cost, which is then subtracted from the actual production cost to yield the abnormal production cost.

$$\frac{COGS_{it}}{Assets_{i,t\text{-}1}} = \beta_1 \frac{1}{Assets_{i,t-1}} + \beta_2 \frac{Sales_{it}}{Assets_{i,t-1}} + \varepsilon_{it} \quad (12)$$

$$\frac{\Delta INV_{it}}{Assets_{i,t\text{-}1}} = \beta_1 \frac{1}{Assets_{i,t-1}} + \beta_2 \frac{\Delta Sales_{it}}{Assets_{i,t-1}} + \beta_3 \frac{\Delta Sales_{i,t-1}}{Assets_{i,t-1}} + \varepsilon_{it} \quad (13)$$

$$\frac{PROD_{it}}{Assets_{i,t\text{-}1}} = \beta_1 \frac{1}{Assets_{i,t-1}} + \beta_2 \frac{Sales_{it}}{Assets_{i,t-1}} + \beta_3 \frac{\Delta Sales_{it}}{Assets_{i,t-1}} + \beta_4 \frac{\Delta Sales_{i,t-1}}{Assets_{i,t-1}} + \varepsilon_{it} \quad (14)$$

where *COGS* is the cost of sales and ΔINV is the variation in inventory.

Finally, according to Cohen and Zarowin (2008), the abnormal discretionary expense is obtained by subtracting the normal discretionary expense derived from Eq. (15) from the actual discretionary expense.

$$\frac{DISCEXP_{it}}{Assets_{i,t\text{-}1}} = \delta_1 \frac{1}{Assets_{i,t-1}} + \delta_2 \frac{Sales_{i,t-1}}{Assets_{i,t-1}} + \varepsilon_{it} \quad (15)$$

At a certain level of sales proceeds, managers may adopt one to three real earnings management activities to adjust the earnings level upward or downward (Cohen et al., 2008). Thus, consistent with Cohen et al. (2008) and Zang (2012), the three proxy variables for real earnings management are combined to form a composite indicator, *RM*:

$$\mathrm{RM}=st.\left(\frac{CFO_{it}}{Assets_{i,t\text{-}1}}\right)\times(-1) + st.\left(\frac{PROD_{it}}{Assets_{i,t\text{-}1}}\right) + st.\left(\frac{DISCEXP_{it}}{Assets_{i,t\text{-}1}}\right)\times(-1) \quad (16)$$

where $st.$ denotes standardization.

(3) Industry competition level

Industry competition level varies according to the total asset of a firm and the number of firms in an industry. Therefore, it is estimated using the Herfindahl–Hirschman index (HHI):

$$HHI_{j,t-1} = \sum_{i=1}^{I} s_{ij,t-1}^2 \quad (17)$$

where $s_{ij,t-1}$ is the market share of firm i in industry j in the previous period. Higher HHI values indicate higher industry concentration and lower levels of intraindustry competition. All sampled firms are classified by the first four-digit code of the Standard Industrial Classification into their respective industries (Chen et al., 2012), and their industry competition levels are subsequently measured.

EMPIRICAL RESULTS

Descriptive statistics and correlation coefficient test

Table 1 shows the descriptive statistics of the sample. For the 2000–2010 period, *ABS_DA* has a mean of 0.011 and standard deviation (SD) of 0.411, indicating that most of the sampled firms adjusted their earnings level upward over the study period. With upward or down adjustment in the earnings level unaccounted for, the *ABS_DA* attains a mean of 0.148 (SD, 0.384), indicating differences in accrual-based earnings management between different firm managers over the study period. Moreover, the mean of *REM* is 0.0025, indicating that most sampled firms implemented real earnings management over the study period. The mean of *R_CFO* and *R_DISCEXP* is 0.653 and 0.563, respectively. The mean of *R_PROD* is 0.002 (SD, 0.754). Notably, the mean of *SYNCH* (−0.36) is significantly higher than that (−1.742) reported by Piotroski and Roulstone (2004), indicating the more frequent concurrent rises and falls in stock prices over the study period. As such, the stock prices of the sampled firms contain more market- and industry-level information but less firm-specific information. Regarding the descriptive statistics for industry competition level, most sampled firms operate in highly competitive industries, with a mean *HHI* of 0.358.

Table 2 illustrates a significantly positive correlation between *ABS_DA* and *SYNCH* (0.069) and a nonsignificantly negative one between *REM* and *SYNCH* (−0.010). An analysis of the proxy variables of *REM* reveals that *SYNCH* correlates significantly and positively with *R_CFO* (0.026) but significantly and negatively with *R_DISCEXP* and *SYNCH*. However, *R_PROD* correlates nonsignificantly and negatively with *SYNCH* (−0.014).

At a certain level of sales proceeds, managers may manipulate one to three real earnings management activities to adjust the earnings level upward or downward (Cohen et al., 2008). Accordingly, an analysis of the relationship among three different real earnings management activities in the present study reveals that *R_CFO* correlates significantly and negatively with *R_PROD* (−0.323) and *R_DISCEXP* (−0.141), as does *R_PROD* with *R_DISCEXP* (−0.410). This indicates a substitution relationship among the three earnings management activities. Table 2 also suggests that firm managers perceive a substitution relationship between accrual-based and real earnings management, which is consistent with the findings of Zang (2012). The correlation between *HHI* and *SYNCH* is significantly positive (0.112), indicating that the more concentrated an industry is (which implies less competition), the less transparent the disclosed information will be. Consequently, stock prices contain less firm-specific information.

Relationships between stock price synchronicity and earnings management strategies

Relationships between stock price synchronicity and earnings management strategies are tested using Eqs. (1) and (2). Table 3 indicates a significantly positive correlation between *ABS_DA* and *SYNCH*. Accordingly, accrual-based earnings management causes stock price synchronicity, indicating that when the earnings level is adjusted by increasing and decreasing accrued revenues or expenses, DAs increase only the interference of earnings (Guay et al., 1996), thereby rendering the current stock return irrelevant to earnings management and corporate stock price less relevant to firm-specific information. By contrast, *REM* correlates significantly and negatively with *SYNCH*, indicating that stock price synchronicity decreases when a timeline for making an investment or financial plan is determined with the intent of altering reported earnings or the items thereof. Therefore, real earnings management affects CFO and accruals, resulting in more firm-specific information being disclosed to investors and stock prices containing more of such information.

Moreover, the significantly positive relationships of *SYNCH* with *R_CFO* and *R_PROD* indicates that when managers manipulate abnormal CFO and production costs independently, stock price synchronicity can occur. This is probably because variations in CFO and production costs can be easily hidden in routine operating activities, making firm-specific information barely accessible and resulting in stock prices containing less of such information. Contrarily, when managers manipulate abnormal discretionary expenses independently, stock prices will contain more firm-specific information and be less synchronous.

Based on the industry environment, the type of earnings management that is implemented affects the value relevance of earnings information. Thus, the threshold model is used to determine the effects of industry competition level on the relationships between stock price synchronicity and different earnings management forms. Regarding the effects of industry competition level on the relationship between accrual-based earnings management and stock price synchronicity (see Table 1, Panel A), industry competition level has a threshold value of 0.209 and is significant ($p < .01$), indicating that a threshold effect exists between accrual-based earnings management and stock price synchronicity; thus, the sampled data can be divided into two groups. The corresponding empirical model is expressed as follows:

$$SYNCH_{i,t} = \alpha_0 + \alpha_1^L DA_{i,t} \times I\left(HHI_{i,t-1} \le 0.209\right) + \alpha_1^H DA_{i,t} \times I\left(HHI_{i,t-1} > 0.209\right) + \sum \alpha_j Control_{i,t} + \varepsilon_{i,t}$$

, where Group 1 ($HHI_{i,t-1} \le 0.209$) comprises firms in relatively less concentrated industries and Group 2 ($HHI_{i,t-1} > 0.209$) comprises those in relatively more concentrated industries. Of the coefficients of both groups (α_1^H = 0.035; α_1^L = 0.087), only α_1^H is significant ($p < .01$), indicating that for firms in relatively more concentrated industries, accrual-based earnings management has a positive effect on stock price synchronicity. By contrast, those in relatively less concentrated industries and with higher supernormal profits tend to safeguard their firm-specific information from access by competitors, thereby causing stock price synchronicity.

Regarding the effects of industry competition level on the relationship between real earnings management and stock price synchronicity (see Table 4, Panel B), industry competition level has a threshold value of 0.19 and is significant ($p < .01$) indicating that a threshold effect exists between real earnings management and stock price synchronicity; thus, the sampled data can be divided into two groups. The corresponding empirical model is expressed as follows:

$$SYNCH_{i,t} = \alpha_0 + \alpha_1^L RM_{i,t} \times I\left(HHI_{i,t-1} \le 0.190\right) + \alpha_1^H RM_{i,t} \times I\left(HHI_{i,t-1} > 0.190\right) + \sum \alpha_j Control_{i,t} + \varepsilon_{i,t}$$

, where Group 1 ($HHI_{i,t-1} \le 0.190$) comprises firms in relatively less concentrated industries and Group 2 ($HHI_{i,t-1} > 0.190$) comprises those in relatively more concentrated industries. The coefficients α_1^L (−0.033) and α_1^H (0.006) of both groups are significant ($p < .05$ and $< .01$, respectively), validating the influence of industry competition

level on the relationship between real earnings management and stock price synchronicity. As such, the managers of firms in relatively more concentrated industries implement real earnings management to gain favor with investors and convey their firms' private information, resulting in their stock prices containing firm-specific information. By contrast, those in relatively less concentrated industries have lower information disclosure, causing stock price synchronicity.

Regarding the relationships between stock price synchronicity and the three real earnings management activities (Table 5), *R_CFO*, *R_DISCEXP*, and *R_PROD* all have one threshold and are significant ($p < .05$ and .1), indicating that the sampled data can be divided into two groups. The corresponding empirical model is expressed as follows:

$$SYNCH_{i,t} = \alpha_0 + \alpha_1^L R\_CFO_{i,t} \times I\left(HHI_{i,t-1} \le 0.107\right) + \alpha_1^H R\_CFO_{i,t} \times I\left(HHI_{i,t-1} > 0.107\right) + \sum \alpha_j Control_{i,t} + \varepsilon_{i,t}$$

$$SYNCH_{i,t} = \alpha_0 + \alpha_1^L R\_PROD_{i,t} \times I\left(HHI_{i,t-1} \le 0.203\right) + \alpha_1^H R\_PROD_{i,t} \times I\left(HHI_{i,t-1} > 0.203\right) + \sum \alpha_j Control_{i,t} + \varepsilon_{i,t}$$

$$SYNCH_{i,t} = \alpha_0 + \alpha_1^L R\_DISCEXP_{i,t} \times I\left(HHI_{i,t-1} \le 0.176\right) + \alpha_1^H R\_DISCEXP_{i,t} \times I\left(HHI_{i,t-1} > 0.176\right) + \sum \alpha_j Control_{i,t} + \varepsilon_{i,t}$$

The empirical results of abnormal CFO and production costs suggest that stock price synchronicity occurs when the managers of firms in relatively more concentrated industries manipulate either real activity independently, or when the managers of firms in relatively less concentrate industries and with higher supernormal profits safeguard their firm-specific information from access by competitors. Moreover, the empirical analysis of abnormal discretionary expenses indicates that when the managers of firms in relatively less concentrated industries manipulate this real activity independently, the stock prices of the firms contain firm-specific information, causing decreases in stock price synchronicity.

CONCLUSIONS

Information asymmetry between firm managers and market investors prevents external financial statement users from ascertaining whether a firm's announced earnings level reflects its actual operating performance or whether accounting numbers have been altered through earnings management. The discretionary behavior of earnings reporting therefore provides a convenient means of exaggerating operating performance. Thus, if market inefficiency occurs and investors have functional fixedness toward earnings and fail to identify the accounting choices that have been implemented by firms, then earnings management may affect the value relevance of earnings information and the synchronicity of stock prices. Moreover, because accrual-based and real earnings management (both of which use different accounting principles) affect the value relevance of earnings, exerting different extents of influence on stock price synchronicity, this study uses stock price synchronicity as a proxy variable for the amount of firm-specific information embedded in stock prices to explore the relationships between stock price synchronicity and both forms of earnings management.

The level of competition varies across industries; the announcement of earnings quality is typically based on the industry environment in which a firm operates. Specifically, for firms operating in high-competition industries, managers tends to implement earnings management to gain favor with its investors, thereby conveying or hiding private information to affect the value relevance of earnings information. Accordingly, this study adopts a threshold model to examine the effects of industry competition level on the relationship between earnings management and stock price synchronicity.

The empirical findings of this study are as follows. First, when the earnings level is adjusted by increasing and decreasing accrued revenues or expenses, DAs increase only the interference of earnings, rendering earnings irrelevant to the current stock return and reducing the correlation between corporate stock price and firm-specific information, which indicates that the stock price contains less firm-specific information. Second, the significantly negative relationship between real earnings management and stock price synchronicity suggests that stock price synchronicity decreases when a timeline for making an investment or financial plan is determined with the intent of altering reported earnings or the items thereof. Third, the managers of firms in relatively less concentrated industries and with higher supernormal profits tend to implement accrual-based earnings management to safeguard their firm-specific information from access by competitors, thereby causing stock price synchronicity. By contrast, the managers of firms in relatively more concentrated industries tend to implement real earnings management to gain favor with their investors. This allows the firms' private information to be conveyed and their stock prices to contain firm-specific information accordingly. Given these findings, government policymaking on mitigating agency problems should address the influence of earnings management on market efficiency in order to safeguard investors' rights and ensure the stability of capital market.

Table 1 Descriptive Statistics

Variables	Mean	Median	Std. Dev.
DA	0.011	-0.003	0.411
ABS _ DA	0.148	0.059	0.384
R _ CFO	0.034	0.062	0.653
R _ DISCEXP	-0.057	-0.106	0.563
R _ PROD	0.002	0.002	0.754
REM	0.025	0.058	1.369
SYNCH	-0.360	-0.363	0.132
HHI	0.358	0.314	0.221
BM	-2.079	0.345	164.756
LEVER	0.152	0.116	0.165
ROA	3.576	5.888	20.897
SIZE	3.008	2.946	0.668
TURN	1.068	0.884	0.851

The definitions of variables:

DA = discretionary accruals computed using the Modified Jones Model;

ABS _ DA = the absolute value of discretionary accruals;

R _ CFO = the level of abnormal cash flows from operations;

R _ PROD = the level of abnormal production costs, where production costs are defined as the sum of cost of goods sold and the change in inventories;

R _ DISCEXP = the level of abnormal discretionary expense, where discretionary expense is the sum of advertising expenses, R&D expenses and SG&A expenses;

REM = the sum of the standardized three real earnings management proxies, *R_CFO*, *R_PROD*, and *R_DISCEXP*;

LEVER = long-term debt scaled by assets;

SIZE = the log of total assets;

TURN = sales scaled by average total assets;

ROA = net income plus interest expense before tax, scaled by average total assets;

BM = the market capitalization divided by the book value of common stock.

Table 2 Pearson Correlation Matrix for Related Variables

Variables	*DA*	*ABS_DA*	*R_CFO*	*R_DISCEXP*	*R_PROD*	*REM*	*SYNCH*	*HHI*	*BM*	*LEVER*	*ROA*	*SIZE*	*TURN*
DA	1.000												
ABS_DA	0.130***	1.000											
R_CFO	0.074***	0.091***	1.000										
R_DISCEXP	-0.020	0.020	-0.141***	1.000									
R_PROD	0.008	0.000	-0.323***	-0.410***	1.000								
REM	-0.023*	-0.052***	-0.597***	-0.569***	0.873***	1.000							
SYNCH	-0.005	0.069***	0.026*	-0.024*	-0.014	-0.010	1.000						
HHI	0.001	0.014	0.014	-0.007	0.003	-0.002	0.112***	1.000					
BM	-0.002	0.004	0.004	0.002	-0.007	-0.007	-0.004	-0.020	1.000				
LEVER	-0.016	-0.148***	-0.148***	-0.050***	0.596	0.128	-0.017	0.001	0.013	1.000			
ROA	-0.012	-0.044***	0.196***	-0.055***	0.068***	-0.112***	-0.023	-0.013	0.014	-0.080***	1.000		
SIZE	0.014	-0.035***	0.027*	-0.038***	-0.075***	-0.007	0.127***	-0.011	0.000	0.243***	0.095***	1.000	
TURN	0.015	-0.038***	-0.075***	-0.094***	-0.018	0.160***	-0.091***	0.031**	-0.009	-0.036**	0.074***	-0.042***	1.000

Notes: *, **, *** Indicate significance at 0.10, 0.05, and 0.01 levels, respectively.

Table 3 The OLS regression tests on the association between earnings management behaviors and stock price synchronicity

$$SYNCH_{i,t} = \alpha_0 + \alpha_1 EM + \sum \alpha_j Control_{i,t} + \varepsilon_{i,t}$$

Dep.	(1)	(2)	(3)	(4)	(5)
α_0	-0.418***	-0.412***	-0.411***	-0.408***	-0.414***
ABS_DA	0.027***	--	--	--	--
R_CFO	--	0.005*	--	--	--
R_DISCEXP	--	--	-0.008**	--	--
R_PROD	--	--	--	0.049***	--
REM	--	--	--	--	-0.001**
BM	<0.001	<0.001	<0.001	<0.001	<0.001
LEVER	-0.039***	-0.038***	-0.042***	-0.044***	-0.041***
ROA	0.001**	0.002**	<0.001**	<0.001**	<0.001**
SIZE	0.028***	0.018***	0.021***	0.024***	0.029***
TURN	-0.013***	-0.011***	-0.014***	-0.015***	-0.014***
$Adj.R^2$	0.032	0.027	0.027	0.029	0.027
F	25.747***	21.523***	21.865***	23.401***	21.889***

Notes: *, **, *** Indicate significance at 0.10, 0.05, and 0.01 levels, respectively.

Table 4 The threshold model on the association between earnings management behaviors and stock price synchronicity

Panel A $SYNCH_{i,t} = \alpha_0 + \alpha_1^L DA_{i,t} \times I(HHI_{i,t-1} \le \gamma) + \alpha_1^H DA_{i,t} \times I(HHI_{i,t-1} > \gamma) + \sum \beta_j C \beta_1^h RM_{i,t} + \varepsilon_{i,t}$			Panel B $SYNCH_{i,t} = \alpha_0 + \alpha_1^L DA_{i,t} \times I(HHI_{i,t-1} \le \gamma) + \alpha_1^H DA_{i,t} \times I(HHI_{i,t-1} > \gamma) + \sum \beta_j C \beta_1^h RM_{i,t} + \varepsilon_{i,t}$		
Threshold variable	Estimator	t	Threshold variable	Estimator	t
HHI	0.209***	3.838	HHI	0.190***	
ABS_DA	coefficients	t	*REM*	coefficients	t
α_1^L	0.087	1.143	α_1^L	-0.033**	-2
α_1^H	0.035***	2.764	α_1^H	0.006***	2
Variables	coefficients	t	Variables	coefficients	t
BM_{t-1}	0.004	0.125	BM_{t-1}	0.002	0
$LEVER_{t-1}$	-0.015	-0.059	$LEVER_{t-1}$	-0.018	-0
ROA_{t-1}	0.001	0.340	ROA_{t-1}	0.002*	
$SIZE_{t-1}$	0.008	0.139	$SIZE_{t-1}$	0.019	
$TURN_{t-1}$	-0.102**	-2.022	$TURN_{t-1}$	-0.085*	-1
HHI_{t-1}	-0.073	-1.033	HHI_{t-1}	-0.049	-1

Notes: *, **, *** Indicate significance at 0.10, 0.05, and 0.01 levels, respectively.

REFERENCES

Amir, E. and B. Lev, 1996, Value-relevance of nonfinancial information: The wireless communications industry, J*ournal of Accounting and Economics*, 22, pp. 3-30.

Ball, R. and P. Brown, 1968, An empirical evaluation of accounting income numbers, *Journal of Accounting Research*, 6(2), pp. 159-177.

Barth, M. E., W. H. Beaver, and W. R. Landsman, 2001, The relevance to the value relevance literature for financial accounting standard setting: Another View, *Journal of Accounting and Economics*, 31, pp. 77-104.

Chen, C.-L., P. –I, Chou, Y.-C., Chen and A. Y. Lin, 2013, The effect of real Activity earnings management on price valuation implication, Advances in Quantitative Analysis of Finance and Accounting, forthcoming.

Cohen, D. A., A. Dey, and T. Z. Lys, 2008, Real and accrual-based earnings management in the pre- and post-sarbanes-oxley periods, *The Accounting Review*, 83 (3), pp. 757-787.

Cohen, D. and Zarowin, P., 2008, Accrual-based and real earnings management activities around seasoned equity offerings, Working Paper (SSRN).

Dechow, P. M., R. Sloan, and A. P. Sweeney, 1995. Detecting earnings management. The Accounting Review, 70 (2), 193-225.

Durnev, A., R. Morck, and B. Yeung, 2001, Does firm-specific information in stock prices guide capital allocation?, NBER Working Paper No.8093.

Durnev, A., R. Morck, B. Yeung, and P. Zarowin, 2003, Does greater firm-specific return variation mean more or less informed stock pricing?, *Journal of Accounting Research*, 41, pp. 797-836.

Francis, J. and K. Schipper, 1999, Have financial statement lost their relevance?, *Journal of Accounting Research*, 37 (2), pp. 319-352.

Guay, W. R., S. P. Kothari, and R. L. Watts, 1996, A market-based evaluation of discretionary-accruals models, *Journal of Accounting Research*, 34, pp. 83-105.

Gupta, M., M. Pevzner, and C. Seethamraju, 2010, The implications of absorption cost accounting and production decisions for future firm performance and valuation, *Contemporary Accounting Research*, 27(3), pp. 889-922.

Hagerman, R. L. and M. E. Zmijewski, 1979, Some economic determinants of accounting policy choice, *Journal of Accounting and Economics*, 1, pp.141-162.

Harris, M., 1998, The association between competition and managers' business segment reporting decision, *Journal of Accounting Research*, 36, pp. 111-128.

Healy, P. M. and J. M. Wahlen, 1999, A review of the earnings management literature and its implications for standard setting, Accounting Horizons, 13, pp. 365-383.

Hou, K. and D. T. Robinson, 2006, Industry concentration and average stock returns, *Journal of Finance*, 61 (4), pp. 1927-1956. Roll, R., 1988, R2, Journal of Finance, 43, pp. 541-566.

Roychowdhury, S., 2006, Earnings management through real activities manipulation, Journal of Accounting and Economics, 42, pp. 335-370.

Sankar, M. and K. R. Subramanyam, 2001, Reporting discretion and private information communication through earnings, Journal of Accounting Research, 39 (2), pp. 365-386,

Schipper, K., 1989, Commentary on earnings management, Accounting Horizons, 3, 91-102.

Subramanyam,K. R., 1996, The pricing of discretionary accruals, Journal of Accounting and Economics, 22, pp. 249-281.

Zang, A. Z., 2012, Evidence on the tradeoff between real manipulation and accrual manipulation, The Accounting Review, 87(2), pp. 675-703.

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Financial Dominance and Inflation Targeting

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Abstract. Financial dominance is the situation of losing value of local currency unities against the international currency unities even though the interest rate has been increased in order to take the increasing inflation rate of a central bank under control. In the countries where financial dominance is in the question, monetary policy cannot be used in order to take the inflation under control. Financial dominance is a situation that the central banks applying the inflation targeting will never want to encounter. The Central Banks and other monetary authorities accepting that the essential purpose of the Central Banks is to provide the price stability have been adopting different monetary policy regimes in order to realize this target . Financial dominance has the meaning of preventing the transferring mechanism as required by wreaking the relationship between market interests and the short term interests determined by central banks for the public debts and therefore the decline of the effectiveness of monetary policy. Governments try to meet their budget deficits by borrowing from the financial markets exceeding the incomes expenditure. Financial dominance states a situation that monetary policy becomes ineffective. The monetary policy is under the pressure of fiscal policy. The reason of this pressure is public deficits requiring continuity. The country that has been exposed to financial dominance among the developing countries and has the feature of presenting a case study for us is Brazil. Brazil confronted with the problem of financial dominance between 2002-2003 year. It passed the 2015 year by recession and the recession conditions will continue quite likely in 2016. Growth forecast for 2015 year is -%3.4 and for 2016 is -%2.6.

Keywords— Financial Dominance, Inflation, Monetary Policy

INTRODUCTION

Financial Dominance

Financial Dominance and Financial Discipline Concept: Financial dominance states a situation that monetary policy becomes ineffective. The monetary policy is under the pressure of fiscal policy. The reason of this pressure is public deficits requiring continuity. There are two ways on financing public debts: borrowing or coinage. It is thought that the financial of the public deficits will not cause inflation by borrowing but the deficits being financed by coining will cause inflation. However, Sargent and Wallace state that public deficits are inflation and even borrowing is more inflationary than monetization. This theory named as monetarist arithmetic being unpleasant claims that the reason of the inflation is not monetary widening, and the solution will not monetary precautions. The moment that Lenders start to be worry about returning of debts, the only thing that the economy management can do is to coin money. In the inflation consisting in this situation, if the debts had been made monetisation since at the beginning, they would have been higher than the inflation to be consisted. (Sezgin 2015) Therefore, if there is financial dominance, fiscal policy will be effective , monetary policy will not. Another effective situation that fiscal policy will be effective is the approach of FTPL. This approach don't accept the viewpoint of "inflation is always and everywhere a monetary situation" and it states that the reason of the inflation is public deficits and debt stock stemming from deficit. (Uygur, 2001b:11)

According to the traditional transition mechanism, central banks aim at total claim conditions by changing short-term interests and thus affecting inflation (Kara vd. 2008:26) However, monetary policy is ineffective because of public deficits and debt stocks. Therefore, transition mechanism don't work, short-term interest rates can't be effective on inflation. Even, quite the contrary, there can even consist an additive effect .Because of an increase in inflation, monetary authority goes to interest rate hike. The interest rate hike will bring saving attractive. Except creating debt capacity by coining for economy management and downgrading the debt level and borrowing cost by the inflation to be consisted, there will not be choice. In this situation, the interest increase will cause higher inflation contrast to what is expected.

The reason of why monetary policy has become ineffective, in other words, the reason of the financial dominance is that there is not financial discipline. In an economy that financial discipline is not found, debt stock will increase. In the existence of high debt and on-going public deficits, the cost of borrowing will increase since the worries related to maintainability of borrowing will increase , the cost of borrowing will increase. As it is seen, the most important effective in terms of financial dominance is financial discipline. While the lack of financial discipline causes financial dominance, the presence of the financial discipline is determinant on abolishing financial dominance. Financial situation is a frame that the things to be done are stated in order to make debt stocks sustainability being unmovable situation as a result of the intervenor state understanding, There are many things in this frame. It hosts different concepts from healing public service performance to increasing productivity of public sector, from decreasing expenditures to investing more noninterest, to providing maintability of noninterest borrowing. it is an anchor being applied commonly in the developing countries where the doubts related to reversibility of debtsare high, the cost of borrowing is high, that have noninterest high debt stock, (Karakurt and Akdemir, 2010:246-247)

Financial dominance has the meaning of preventing the transferring mechanism as required by wreaking the relationship between market interests and the short term interests determined by central banks for the public debts and therefore the decline of the effectiveness of monetary policy. Governments try to meet their budget deficits by borrowing from the financial markets exceeding the incomes expenditure. However, this situation, in the countries where public debt is

so high, causes transferring the most of the sources of giving debts in the financial markets to public and decreasing significantly the credit opportunity to be given to private sector. In such a situation, since the effectiveness of the transmission mechanism is lost for interest general level and credit market channel's directly, for expectation channel indirectly, the monetary policy doesn't become effective enough on demand and inflation. Therefore, providing financial discipline and having low financial dominance is a precondition for the inflation targeting regime to be successful.

It is used commonly as a performance criteria by IMF. Noninterest surplus is one of the methods developed for measuring and targeting analyticaly annual performances of public institutions. (Cansız, 2006:69) Beforehand, the economies having firstly a deficit constantly, they have increased debt stock. (İnan, 2003:19) Now, noninterest surplus should pay penance of these first sins. Reaching of debt stock to levels of unmovable have caused noninterest concept to gain importance. Noninterest is the rest of amount after taking out the primarily costs from budget incomes. (Tanner and Ramos, 2002:3) Noninterest is important for two views. The first is to give guarantee to debtees . While the debt load is much, the maintability of borrowing can be provided by firm fiscal policies and therefore, by noninterest surplus (Güdal, 2008:422) The function of noninterest surplus is the addition of a debt payment capacity over national rate of increase. Therefore, firstly the debt stock will be prevented, then debt stock will be decreased. Secondlyit provides the pressure over borrowing to be easy. (Heinemann and Winschel, 2001) Noninterest debt stock is important on decreasing debt stock and declining borrowing costs. However, it is not enough. Real interest rates and rate of growth are two important parameters. (Woodford, 1996:16-18) Creating additional source in order to pay interest decrease both the need of borrowing and real interests. Maintability borrowing means the rate of debt stock to national revenue to stay fix in long term.. (Ceylan. 2010:390) There are various variants affecting the perception of the maintability of debts. Growing of National income, debt stock of public, real interest and noninterest surplus are the fundamentals of them. (Ulusoy vd. 2006:9-10)

The inflation having important effects in all economic indicators are important in terms of sustainability of debt. (Motley, 1983:31)Noninterest can provide contribution to the sustainability of borrowing by declining the inflation down. In the analysis of sustainability of borrowing, the approach of interperiod borrowing constraint becomes prominent. This approach means that borrowing is not possible to sustain with new borrowing, what makes borrowing sustainability is noninterest surplus. (Aslan, 2009:229) Noninterest surplus reaches to its target provides the necessity of borrowing of public section, and quick decline of risk premium, and declining the effect of crowding-out and financial constraint of private section. (Özmen and Yalçın, 2007:8) there are a few things to be made to give noninterest surplus: increase income, decline non-interest expenditures or make realize both of them together. They are usual public income taxes. (Kelman, 1979:853)Therefore, income increase means the increase in the tax income. Because, in the developed countries, the 90,95% of all incomes are tax incomes.. (İlhan, 2007:2) In the stability programmes that especially developing countries carry out, incomes for once only by disposing public goods and business in order to realize the targets in short-term have been provided, in this way, it is seen that the criteria of performance have been tried to made. (Aydoğdu, 2004:18) The most healthy way of increasing the tax incomes is to decline the tax leakage by spreading them to base, therefore, increase the tax revenue in healthy way. The first thing to be done in order to spread the tax to base is to prevent black economy. Black economy decrease the tax potential by narrowing the tax basis. (Lucinda and Arvate, 2005:16) Exceptions cause a similar effect to black economy (Saatçi, 2007:94)

FINANCIAL DOMINANCE AND MONETERY POLICY

Financial dominance is the situation of losing value of local currency unities against the international currency unities even though the interest rate has been increased in order to take the increasing inflation rate of a central bank under control. In the economies that financial dominance situation is not valid; making interest rate increase is resulted with gaining value of local currency unity. However, the international investors who evaluate the possibility of failure to service the public debt as high avoid from bearing the risk of the related country by thinking that the possibility of failure to service the public debt together with the increase of the interest rate has increased further. In other words, they use the portfolio choices for accomplishing capital outflows from the country that they have thought that it may bring the public debt not to be paid by increasing the interest rate and whose public debt is high. The process ends by not accomplishing it's any target of a central bank which tries to take the inflation rate under control and to increase the value of country's currency unit by increasing interest rate. In the countries where financial dominance is in the question, monetary policy cannot be used in order to take the inflation under control. However, the monetary policy has lost its function by the reasons explained above. Under these conditions, the way of controlling the inflation and providing the price stability is to use the fiscal policies.

In an economy that financial dominance is valid; two factors determine the currency increase emerging by the interest increase: the level of possibility of public debt not to be serviced and the international investors' degree of avoiding the risk. The possibility and rating calculations related to both factors can be made according to mathematical and econometric models. At this point, the rate of country's debt to national income, the currency unit composition and expiry of the debt and the possibility of not servicing of the debt are important factors affecting the degree of risk avoidance of investors.

The possibility of emerging of financial dominance in the developed countries is low. After 2008 crisis, the rates of the public debts of the developed countries to national income have increased significantly. However, there is not a market perception like not paying their debts of these countries and no any central bank of developed country could not enter the interest increase process. Financial dominance is a situation that the central banks applying the inflation targeting will never want to encounter. Besides, inflation targeting works sturdily in developed countries rather than developing countries due to the conditions to be successful..Therefore, it is not suitable and right for a country that may confront with the financial dominance risk to apply the inflation targeting through monetary policy. The country that has been exposed to financial dominance among the developing countries and has the feature of presenting a case study for us is Brazil. Brazil confronted with the problem of financial dominance between 2002-2003 year. It passed the 2015 year by recession and the recession conditions will continue quite likely in 2016. Growth forecast for 2015 year is -%3.4 and for 2016 is -%2.6.

FINANCIAL DOMINANCE AND PRACTISES

While Brazil tried to pull the inflation rate to %4.5, the realization of 2015 year was %9.6.The rate of budget deficit to national income is at the level of %6 and the rate of public debt to national income is at the level of %34.3 as of November 2015. The interest rate of 10-year government bonds of Brazil is around %15.9. Banco Central do Brasil has brought the policy interest rate (Selic) being %7.25 in October 2012 to the level of %14.25 as a final. The rate was 11.75% at the beginning of 2015. In other words, the policy interest was increased in 2015. However, Dolar/Real currency being at the value of 2.70 at this time last year is now at the level of 4.03.

Real has experienced a 49% loss in value in a year despite of the interest rate hike of the Central Bank and inflation has increased as it hasn't been taken under control. Concerning the rate of national income when compared with the European countries, the public debt of Brasil is not so high. However, an economical structure depending on natural resources including petrol is in the question and a decline in global commodity prices has been being happened. This situation keeps the economy of Brasil at the recession conditions and there is a political turmoil because of corruptions in the country. Under these conditions, the international investors see the risk of non-payment of public debt high and try to avoid the risk of Brasil.

INFLATION TARGETING

The policy of inflation targeting which is adopted by many countries as a main monetary policy. This framework necessitated credibility, accountability, transparency and independency of Central Banks in the design and practice of monetary policy and in this respect these prerequisites . (Büber, 2006 s.3) The idea that inflation has been always and everywhere a monetary issue has monetary policies spread in order to provide price stability. As monetary policy providing the price stability, monetary targeting policy has been applied firstly in world economies. By the reason that the relationship of money amounts with prices has been weaken, while the monetary targeting policy is left, exchange rate targeting policies have been taken place.

However, because of the extreme changes happening in the exchange rate, as soon as economic crisis becomes frequent, the directly targeting policy of inflation has started to be widespread. Financial dominance is a factor limiting the monetary policy. Because of the budget deficits lasting for long years, the debt stocks increasing have been limiting the monetary policy effectiveness, have been causing financial dominance. The policy interest being the main tool of monetary policy don't perform as stability provider, but perform the function of stability deteriorate because of the public debt stocks. The Central Banks and other monetary authorities accepting that the essential purpose of the Central Banks is to provide the price stability have been adopting different monetary policy regimes in order to realize this target and have been applying .

First, at the beginning of the 1990s, some countries adopted the inflation targeting as the monetary policy regime. The main reason for the switch to inflation targeting in these countries is that there are a number of objectionable aspects of other monetary policy regimes. The inflation targeting as monetary policy strategy has spread from OECD countries integrated with small another world to many developing economies taken place in East Europe, Latin America and Asia. The first adopting inflation targeting country in 1990 is New Zealand. Canada has followed this country in 1991, England has followed this country in 1992, and Sweden and Australia have followed this country in 1993. The Finland and Spanish had accepted the inflation targeting before being the member of the Economic and Monetary Union . In the developing countries such as Besides, Chilli, Israel, Mexico and Brasil, the inflation targeting has been adopted and they have accepted to get through (Demirhan, 2002: 67).

THE PRECONDITIONS OF INFLATION TARGETING REGIME

In order to make the regime of inflation targeting apply and to be successful, it requires that some preconditions should be provided in economy. These preconditions:

1. Dependency on the price stability target firmly (focusing on target)
2. There is Independence, accountable and reliable a Central Bank
3. Having Strong and developed a financial markets
4. Low financial dominance
5. Providing technical infrastructure

CONCLUSION

In terms of monetary policy, the critical point is that there is no financial dominance. In an economy where there is financial dominance, monetary policy can not be effective in ensuring price stability. It can be said that even price stability will affect negatively. When the traditional transmission mechanism increases interest rates, demand will weaken and inflation will weaken. And when the interest rates decrease, the demand tends to revive and increase inflation.

The increase in interest has served not for price stability but for instability. Monetary policy seems to be ineffective even at a time when financial balances are in place. This shows us that financial dominance in the Turkish economy is structural. As stated in the fiscal theory of the price level, the price stability in the Turkish economy is determined by the public economy, the monetary policy should be coordinated with the fiscal policy, contrary to the expectation of monitoring the monetary policy independent of the fiscal policy.

REFERENCES

Calvo, G. Reinhart, C.(2000), Fear of Floating. NBER Working Paper, 7993.

Tunca A.(2017)," Mali Baskınlık (fiscal dominance)" 12.01.2016, http://ardatunca.blogspot.com.tr/2016/01/mali-basknlk-fiscal-dominance.html, 01.04.2017
http://www.mevzuatdergisi.com/2010/06a/02.htm, Zübeyir TURAN," Inflation Targeting and Inflation Policy Application Results", Year: 13, Issue:150, June 2010

Büyükakin T, Erarslan C., " Inflation targeting and Evaluation of its Applicability in Turkey" Social Sciences Institute Journal Kocaeli Üniversity, 2004/2

Büber S.(2006), İstanbul Bilgi University, Faculty: Social Sciences Institute," Inflation Targeting", Uprinted Master Thesis, İstanbul

Sezgin F.(2015), "Financial Dominance on Turkish Economy After Crisis -Kriz Sonrasında Türkiye Ekonomisinde Mali Baskınlık", Trakya University Social Science Journal 2015 V. 17 Issue 1, S.85

Demirhan, E., (2002), "Para Politikasının Değişen Yüzü: Enflasyon Hedeflemesi", İstanbul: Türkiye Bankalar Birliği (TBB)

Uygur, Ercan (2001b). "Enflasyon. Para ve Mali Baskı: İktisat Politikasında Geri Kalmışlık". İktisat İşletme ve Finans XVI (189):7-23

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