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Accounting Application over the Edgeworth Box to Assess Banking Activity in Southeast Asia Countries

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Abstract

The manuscript considers that accounting information of financial statements is synthetic information of the process of decision-making, and the Edgeworth box is a laboratory to assess banking activity. The effects of decision-making process are explained by economic-financial models according to the principle of double entry. This model enables getting an accounting equilibrium equation with four variables which have economic and financial significance and can be represented in an Edgeworth bo by several transformations. The banking positions in the Edgeworth box visually explain levels of financial risk and their respective economic covertures according to the evolution of macroeconomic variables in Southeast Asian countries.

Keywords: Accounting Methodology, Box of Edgeworth, Monetary Policy

JEL Classification: E520, M410, O320, P500

1. Introduction

This manuscript analyzes the banking activity of Asian Southeast countries. The diversity of their cultures (Jacobs, Neubauer, & Ye, 2018) as well as their experience on financial crisis of the 90s are issues that draw attention regarding their answers to overcome the current financial crisis (Rüland, 2018. Rethel, 2019. Rethel, & Thurbon. 2019). The manuscript presents the Edgeworth box as an accounting laboratory where each position has an economic-financial significance (Perez, 2015). The applying of the accounting principle of double entry on transactions of companies enables building an accounting theoretical model according to the European Accounting System (EAS 2013). The aggregation of accounts of financial statement according to their economic and financial nature has as result a dynamic equilibrium equation, which is represented in the Edgeworth box after several transformations. A position of equilibrium in the Edgeworth box is measured by two indicators with their respective economic and financial meaning, and they allow contrasting the banking activity with macroeconomic variables where banks are located. (OCDE, 2018. ADE, 2017).

The negative rate of interest, the level of public debt regarding GDP and derivate products over the counter (OTC) are some components that have been characterizing the latent financial crisis of the early 21st century (Beeson, &

Diez, 2018). The framework of the Basel Committee on Banking Supervision has been the answer to this situation by monitoring levels of risk-based capital ratio, the leverage ratio and the liquidity metrics on banking activity, they are the three pillars of banking supervision of BASIL III (BIS, 2018. Kranke, & Yarrow, 2018)

The aim of this regulation was to give stability to financial markets, but the Basel Committee carried on with the supervising activity on global systematically important financial institutions (SIFls), global systematically important banks (G-SIBs) and domestic systematically important banks (D-SIBs) (BIS 2017). The supervising on shadow banking system of the Financial Stability Board (FSB 2018) and the local activity of Asian Development Bank (ADB) are coming together with this activity for further strengthening of the region's resilience to external shocks, and all of that according to Chairman's Statement of the 13th East Asia Summit delivery at Singapore 2018. The ADB carry out its activity based on principles of Regional Public Goods and considering risks of the increasing regional and global integration but remembering the effects of last 1997/98 Asian financial crisis (ADB 2018). Nevertheless, despite these cautions, the International Monetary Fund reports on Asian Pacific considers the resilience period of financial markets is still latent (IMF 2018a).

The manuscript has four sections. This section is the presentation of the scenario where the accounting methodology over the Edgeworth box is applied. The second section presents the accounting equation of equilibrium and its representation in the Edgeworth box. The comparison of banking positions regarding macroeconomic variables from 2012 to 2017 is made in the third section, considering the results of supervising activity of the Basel Committee on banking activity in the Asian continent. Conclusions is the last section of this manuscript where the prudential decisions of banking activity are explained within the researched period.

2. The accounting methodology over the Edgeworth box (AMEB).

2.1. The economic and financial information of financial statements

The financial statements are results of the process of decision-making during a period. These decisions are recorded in an accounting information system (EAS 2010, SNA 2008) according to a framework based on the principle of double entry as well as accrual principle (Eurostat, 2013. ONU, 2009). Adding the accounting information of units of economic activity by applying EAS 2010 and SNA 2008, the macroeconomic variables of countries can be built for their governments and supranational entities, so these can make decisions under a same accounting criterion.

This manuscript considers that the banking activity is the counterpart of economic transactions in the economy of a country. So, figure 1 is the economic-financial accounting model that explains the activity of financial and non-financial entities, which can be the State, local governments or companies.

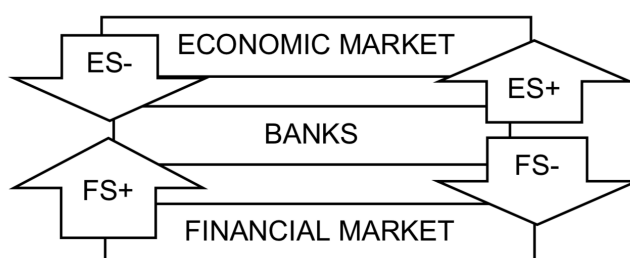*Figure 1. Accounting economic-financial model*

Banks make economic and financial transactions to develop their activity. The goals of banking activity are the management of monetary savings of sectors and subsectors which do not include Financial corporations S.12 of EAS 2010 (EAS 2013). The performance of banking activity can be explained by expression 1.

$$ES(+) - ES(-) = FS(+) - FS(-) \tag{1}$$

Where:

ES (-) = Negative economic sources are economic transactions for acquisitions of goods and services from the economic market.

ES (+) = Positive economic sources are economic transactions for the alienation and sales of goods and services to the economic market.

FS (-) = Negative financial sources are the counter part of economic (ES(-)) and financial positive transactions (FS(+)).

FS (+) = Positive financial sources are the counter part of economic (ES(-)) and financial negative transactions (FS(-)).

By making differences on both economic and financial transactions of equation (1), the equilibrium of banking activity presents the following equation:

$$R - VA = VF - MS \tag{2}$$

Where:

OR is the Operative result or economic cash-flow

VA is variation on assets or real economic assets maintained in company VF is variation of the financial position among liabilities and credits

MS is the monetary saving or monetary cash flow.

Making transpositions of accounting variables of expression (2) to obtain positive values of them the result is as follows:

$$VF + VA = OR + MS \tag{3}$$

The expression (3) pursuits the adjustment the financial position of banks avoiding the application of accounting policies used by banks and regulatory institutions of the financial markets. So, adjustments for depreciations and provisions have effect on net result as well as on the respective assets and liabilities to obtain economic cash flow (OR), and according to criterium of EAS 2010, VF is the compensated values of financial instruments (assets and liabilities) of banking balance sheet for getting their net financial position.

2.2. Application of the Edgeworth box to Southeast Asian banks

2.2.1. Financial Statements and the equilibrium dynamic equation.

The financial statements are synthetic information of annual banking activity, and according to the economic and financial nature of accounts, the table 1 presents relations between them and accounting variables of expression 3.

Table 1. Accounts of equilibrium equation.

Assets	1 Step	2 Step	3 Step
Loans (Agregate velue)	FA	VFA	VFA
Gross loans			
Less: reserves for impaired loans/NPLs (a) (b)			OR3(+)
Other earning assets {Aggregate value)	FA	VFA	VFA
Default credit (memories) (b)			OR2(+)
Fixes Assets (Aggregate value)	EA	VEA	VEA
Non-earning assets (Aggregate value)	EA	VEA	VEA
Cash & Central Bank balance	MA	VMA	VMA
Goodwill	EA	VEA	VEA
Other Intangible Assets	EA	VEA	VEA
TOTAL ASSETS	FA+EA+MA	Σ(V)	Σ(V)+OR2+OR3

Liabilities and Equity			
Deposits & short-term funding (Aggregate value)	ML	VML	VML
Other interest-bearing liabilities (Aggregate value)	FL	VFL	VFL
Other (non-interest bearing) (Aggregate value)	FL	VFL	VFL
Reserves {Aggregate value)	SF	VSF	VSF
Net Result (Profit and loss)			OR1(-)
Equity	SF	VSF	VSF
TOTAL LIABILTIES AND EQUITY	ML+FL+SF	Σ(V)	
Net Result (Profit and loss)			OR1(+)
Default credit (memories) (b)			OR2(+)
Provisions (Memo) (a) (b)			OR3(+)
			Σ(V)+OR2+OR3

(a) Same value and accounts, (b) Gross annual variation of assets

The expression 3 is the balance of banking activity of a company in a period and prior to include its equilibrium position in Edgeworth box, three steps of table 1 must be followed. The economic, financial and monetary nature of variables of table 1 have assigned letters E, F and M, respectively. Columns 1 Step and 2 Step are variations of accounting variables between two consecutive periods, and column 3 Step is a variable of expression 3. The Equity is the financial duty of bank according to Shareholder Funds (SF) and these duties are considered as the VF variable of expression 3. So, the expression 4 is the aggregated value to obtain the expression 3 when the adjustment of accounting policies is applied on the balance sheet.

$$VFA+OR2+0R3+VEA+VMA = VML+VFL+VSF-OR1 + (OR1+0R2+0R3) \tag{4}$$

The variables of equation (4) can be aggregated to obtain the equilibrium dynamic equation (3) as follows:

$$VF = VFA + OR2 + OR3 -VFL- VSF + OR1 \tag{5}$$
$$VA=VEA \tag{6}$$
$$MS = VMA-VML \tag{7}$$
$$OR = OR1+0R2+0R3 \tag{8}$$

The steps of table 1 are applied on a banking entity from the sample for a better explanation of the result obtained and table 2 shows the values of variables of expression 4.

Table 2. Accounts' balance sheet and results of BMI bank

Assets	1 Step	31/12/2017 mil EUR	31/12/2016 mil EUR	2 Step	3 Step
Loans (Agg. value)	VFA	277741	294767	-7026	-7026
Gross loans		278334	295375	-7041	-7041
Less: reserves for impaired loans/NPLs (a) (b)	OR3(+)	593	608		-15
Other earning assets (Agg. value)	VFA	30939	35244	-4305	-4305
Doubtful credit (memories) (b)	OR2(+)				2407
Fixes Assets (Aggregate value)	VEA	27332	19203	8129	8129
Non-earning assets (Agg. value)		36638	37820	-1183	-1183
Cash & Central Bank balance	VMA	27238	32792	-5554	-5554
Goodwill	VEA	n.d.	n.d.		0
Other Intangible Assets	VEA	9399	5028		0
TOTAL ASSETS	Σ(V)+OR2+OR3	**372649**	**387034**	**-4385**	**-1993**

Liabilities & Equity					
Deposits & short-term funding (Agg. value)	VML	294795	303442	-8648	-8648
Other interest-bearing liabilities (Agg. value)	VFL	n.d.	n.d.		0
Other (non-interest bearing) (Agg. value)	VFL	2376	2711	-335	-335
Reserves (Agg. value)	VSF	3953	2393	1560	1560
Net Result (Profit and loss)	OR1(-)				4277
Equity	VSF	71526	78488	-6962	-6962
TOTAL LIABILITIES AND EQUITY		**372649**	**387034**	**-4385**	**---/---**
Net Result (Profit and loss)	OR1(+)	4277	4812	---/---	4277
Doubtful credit (memories) (b)	OR2(+)	4116	1709	2407	2407
Provisions (Memo) (a) (b)	OR3(+)	593	608	-15	-15
	Σ(V)+OR2+OR3				**-1993**

(a) Same value and accounts, (b) Gross annual variation of assets

The values of table 2 on column 3 Step allows to obtain the expression 3 as follows:

$$VF\ (-8925) + VA\ (12500) = MS\ (-3094) + OR\ (6669) \qquad (9)$$

The values of expression 9 are shown on table 3, which are aggregated values of table 2, according to expressions 5, 6, 7 and 8. The negative value of expression 5 must be amended because they represent an economic-financial position of a bank on a year, which must be put in contrast to other annual positions in the research period. So, variables maintain their position on equation 3 regardless of their values, which must be positive to be represented in an Edgeworth box. This criterium is in accordance to the theorical accounting model of figure 1 and expression 3 for each year in the research period.

Table 5. Real value of position BMI in Edgeworth box

Variables	Step 1 2017	Step 1 2016	2 Step (Δ/∂)	3 Step
VF	230825	246419	-15594	-8925
VA	36731	24231	12500	12500
SUM ASSETS	267556	270650	3094	3575
MS	267556	270650	-3094	-3094
OR				6669
SUM LIABILITIES	267556	270650	3094	3575

2.2.2. The accounting positions of the banking activity in Edgeworth box.

The representation of annual equilibrium dynamic equations (expression 9) in Edgeworth box must be transformed according to an equivalent criterion in order to contrast them. In order carry this out, two transformations must be made. The first one is converting possible negative values of the equilibrium dynamic equation into positive values, and the second one is obtaining the relative value from the transformed value on the first one. These relative values are the real position in Edgeworth box. So, the limits of each axes of the Edgeworth box are zero and 100%. Considering the annual equation of equilibriums in the research period, the maximum- minimum value of temporary data series must be selected. The second step is to obtain the absolute value of maximum-minimum value (|Mm|) multiplied by two (|Mn|*2), and this last value is a change of origin (Xo) on the same canonical base for all values of the data series. Expression 10 is the first transformation of the annual series value.

$$VF1 + VA1 = MS1 + RO1 \qquad (10)$$

VF1=VF+Xo; VA1=VA+Xo; MS1=MS+Xo; RO1=RO+Xo
|Mm| = The absolute value of maximum-minimum value
Xo = |Mm|*2, Xo is the change of origin on temporary series

The second transformation could be made when values of expression 10 are positive. The second transformation is dividing each variable of expression 10 by the respective sum of assets and liabilities. The expression 11 is the transformation of annual series value to be represented in an Edgeworth box, and it is the real position in the Edgeworth box.

$$VF2 + VA2 = MS2 + RO2 \tag{11}$$

$$VF1 + VA1 = SUM; \ MS1 + RO1 = SUM$$
$$VF2 = VF1/SUM; \ VA2 = VA1/SUM; \ MS2 = MS1/SUM; \ RO2 = RO1/SUM$$

The application of both transformations on the example of the BMI bank are on table 6 and their annual representation are in the Edgeworth box of figure 2. The expressions 10 and 11 are results of transformation on values of accounting equation of equilibrium on a year and their applications are the columns of table 6. The first column of table 6 is the last column of table 5 <<3 Step>>, and the change of origin has been applied on its values (Xo=87.277) to obtain values of variables in expression 10. The last column of table 6 is the second transformation to obtain the real position in the Edgeworth box.

The table 6 presents both transformations made on value of table 5 according to information of financial statements of the BMI bank, which has been obtained from the Orbis data base over license of University of Valencia. The change of origin (Xo) is the maximum-minimum of the annual values that the BMI bank has taken on each year in the research period. So that, all changed values maintain their relative positions but with positive values. This strategy maintains the accounting theoretical economic- financial model without any change on the positions of variables in the equilibrium dynamic equation. The last transformation is the obtaining of the relative values of variables of column <<transformation 1>> for being included in the Edgeworth box of figure 2.

Table 6. Transformations

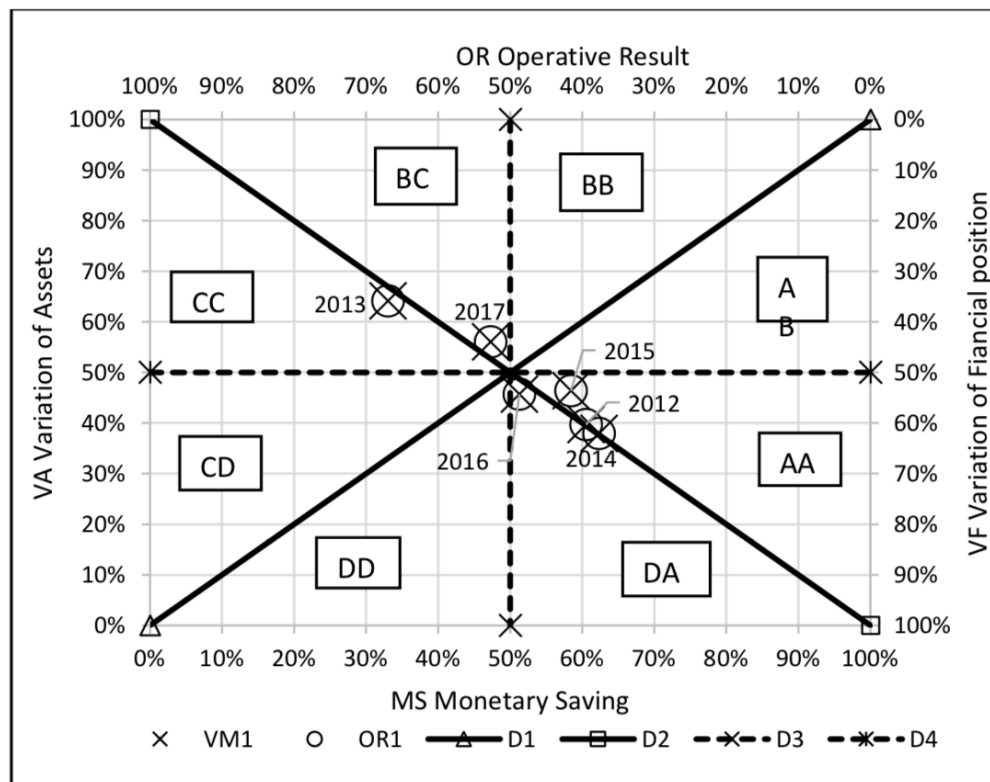|	3 Step table 5	transformation 1	transformation 2
VF1	-8925	78353	44%
VE1	12500	99778	56%
	3575	178131	100%
MS1	-3094	84184	47%
OR1	6669	93947	53%
	3575	178131	100%
Minimum	-43639		
Xo =	Minimum*2=	87.277,72422	

Figure 2. Observations of BMI bank in period from 2012 to 2017.

The equilibrium position of the year 2017 of table 6 is represented in zone CB in the *Edgeworth box of figure 2. The several annual observations have been transformed by the same steps of observation of 2017 and it allows to contrast them. The limits of axes of accounting in the Edgeworth box are fix and they do not change because the theoretical accounting model is applied on all accounting financial statements whether they belong to financial or non-financial companies.

The interpretation of financial and economic observations in the accounting Edgeworth box is built by two indicators: Lambda (L) and Gamma (G). The first of them has financial significance and the second one has economic significance, according to following expressions.

$$L = VF/OR – VA/MS \qquad (12)$$

$$G = VA/OR – VF/MS \qquad (13)$$

The Lambda (L) indicator explains how many times banks give credit to market (VF) in relation to the operative result (OR) obtained in a year minus the times the monetary saving (MS) is covered by economic assets (VA). This L indicator has financial significance. The Gamma (G) indicator explains the economic position of banks in the Edgeworth box because it measures how many times the economic assets obtained or investment in economic goods (VA) contains the operative result (OR) minus the risk to concession credit (VF) to markets in relation to monetary saving (MS) obtained from markets in a year.

The financial and economic measure of positions in areas of the Edgeworth box by L and G indicators allows to consider the level of risk adopted by banks. Considering their representation on figure 2, the diagonal D1 represents the evolution of the L indicator when the G indicator takes a null value, and diagonal D2 represents the evolution of the G indicator when the L indicator takes a null value. So, the table 7 displays the level of risk of banking activity in the Edgeworth box, and its areas are limited between dashed and continued lines. The location of banking activity on the AA area does not have risk of management and there is a high level of risk when the observation in the Edgeworth box is located on the CC area. So, areas with A letter have low level of risk and areas with C letter have high level of risk and areas with B and D letters have intermediate positions of risk.

Table 7. Risk areas in Edgeworth box

	AA	AB	BB	BC	CC	CD	DD	DA
L	+	+	-	-	-	-	+	+
G	+	+	+	+	-	-	-	-
L<>G	|L|>|G|	|L|<|G|	|L|<|G|	|L|>|G|	|L|>|G|	|L|<|G|	|L|<|G|	|L|>|G|

The value of L and G indicators for annual positions of BMI in Edgeworth box of figure 2 are on table 8, as well as its leverage ratios obtained from the Orbis data base.

Table 8. Indicators of BMI bank

Indicador/year	2017	2016	2015	2014	2013	2012	2011
L	-0,3512	0,2225	0,4972	1,0395	-1,4060	0,8705	np
G	0,1313	-0,1207	0,1967	0,0110	-0,1299	0,0080	np
Area	BC	DA	AA	AA	CC	AA	
Total capital ratio	21,59	24,32	19,33	19,45	21	13,46	15,84
Tier 1 Ratio	20,79	23,47	18,46	n.d.	n.d.	n.d.	n.d.
Total Capital	70644	78227	56300	42044	36973	28354	30076
Tier 1 Capital	68014	75486	53752	40133	35297	26322	28536
Total capital ratio^-1	0,0463	0,0411	0,0517	0,0514	0,0476	0,0743	0,0631
variation G	1	2	1	1	2	1	0
Variation Total capital ratio^-1	1	2	1	1	2	1	0

The result of table 8 obtained from the accounting methodology over the Edgeworth box (AMEB) and Orbis data base belonging to BMI are put in contrast by rows <<variation G>> and <<variation Total capital ratio^-1>>. The accounting indicators L and G of AMEB show that 2013 has a bad position in the Edgeworth box because the OR is higher than the MS, as well as the level of VA is higher than MS, and both indicators are negative. So, banks struggle to make its banking activity and adopt a position of financial hedge by investing on real assets. The best positions of banks are 2012, 2014 and 2015 because in these years, the BMI is located on area AA where monetary saving (MS) is higher than the operative result (OR) and banks can develop its banking activity because its financial positions (VF) is higher than the investment on assets (VA). The years 2016 and 2017 are years of resilience but with differentiated strategies and adopting prudential positions in the center of the Edgeworth box.

The Tier 1 capital ratio is defined as the Capital Measure (Core Equity Capital - the numerator) divided by the Exposure Measure (Total risk-weighted assets (RWA) - the denominator), and expressed as a percentage (BIS,2014, 2017). The gross interannual difference between the inversed values of Total capital ratio and G indicator have the same evolution, which is scored by 1 and 2 for marking their respective increase and decrease.

The G indicator measures the level of economic hedge in relation to the financial position of the L indicator. Both Basel indicator and Edgeworth box indicators (L and G) measure the level of risk that banking activity has reached over a year. Although Tier 1 increases when one of the indicators L and G adopt a negative value, these last ones take reference from four accounting variables at the same time and indicate which alternative decisions a bank should adopt to avoid a risk area.

3. The assessment of Asian banking activity.

3.1. Annual assessment of Asian banking activity.

This section assesses the annual behavior of banking activity in Southeast Asia. The information of financial statements of Asian banks has been obtained from the Orbis data base with license over University of Valencia applying these criteria: data update 09/27/2018, export data 03/10/2018, Region Asian, type of companies: banks

and Hedge funds, listed companies 185. The first goal is analyzing both kinds of companies to contrast them, but according to information obtained by applying the methodology AMEB, the activity of banks has been analyzed and table 9 has the numbers of banks analyzed by year.

Table 9. Areas of Edgeworth`s box of Southeast Asian banks

Years	CC	CD	DD	DA	AA	AB	BB	BC	Total Banks
2012	15	22	21	74	26	0	3	5	166
2013	36	13	12	53	34	1	7	10	166
2014	8	7	7	88	42	4	5	6	167
2015	16	6	10	59	43	13	8	12	167
2016	12	14	8	67	36	9	7	12	165
2017	41	14	15	44	16	13	7	16	166
Sum	128	76	73	385	197	40	37	61	997

The result of table 9 has numeric positions adopted by banking activity within the period of research. The banking activity improves in year 2014 because banks adopt a higher number of positions on area DA with a low level of risk of management. The banking activity adopts bad positions on years 2013 and 2017 because the CC area has a high level of risk, and years 2012, 2015 and 2016 can be considered as resilience periods. Moreover, the visual location of banking activity on figure 3 are the results of table 9, and their relative positions are measured on table 10, represented by dashed lines in each annual Edgeworth box.
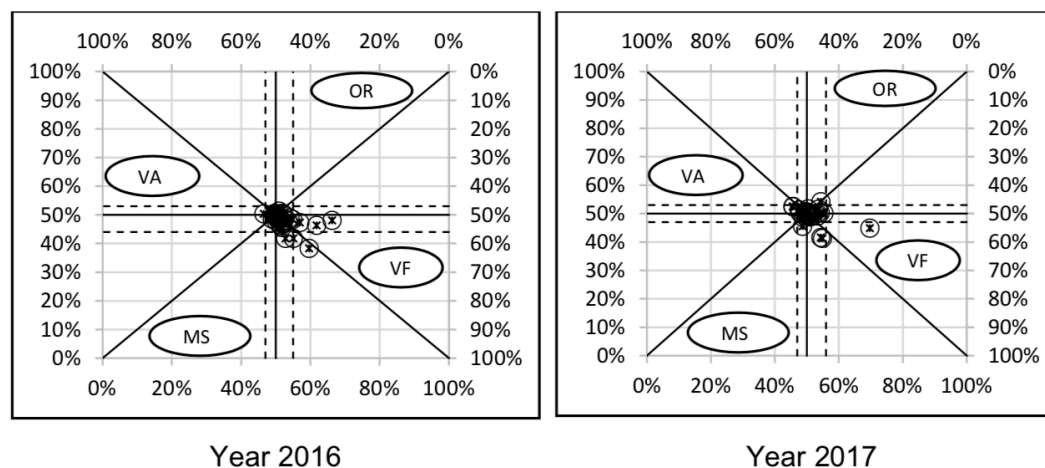

Year 2012

Year 2013

Year 2014

Year 2015

Year 2016   Year 2017
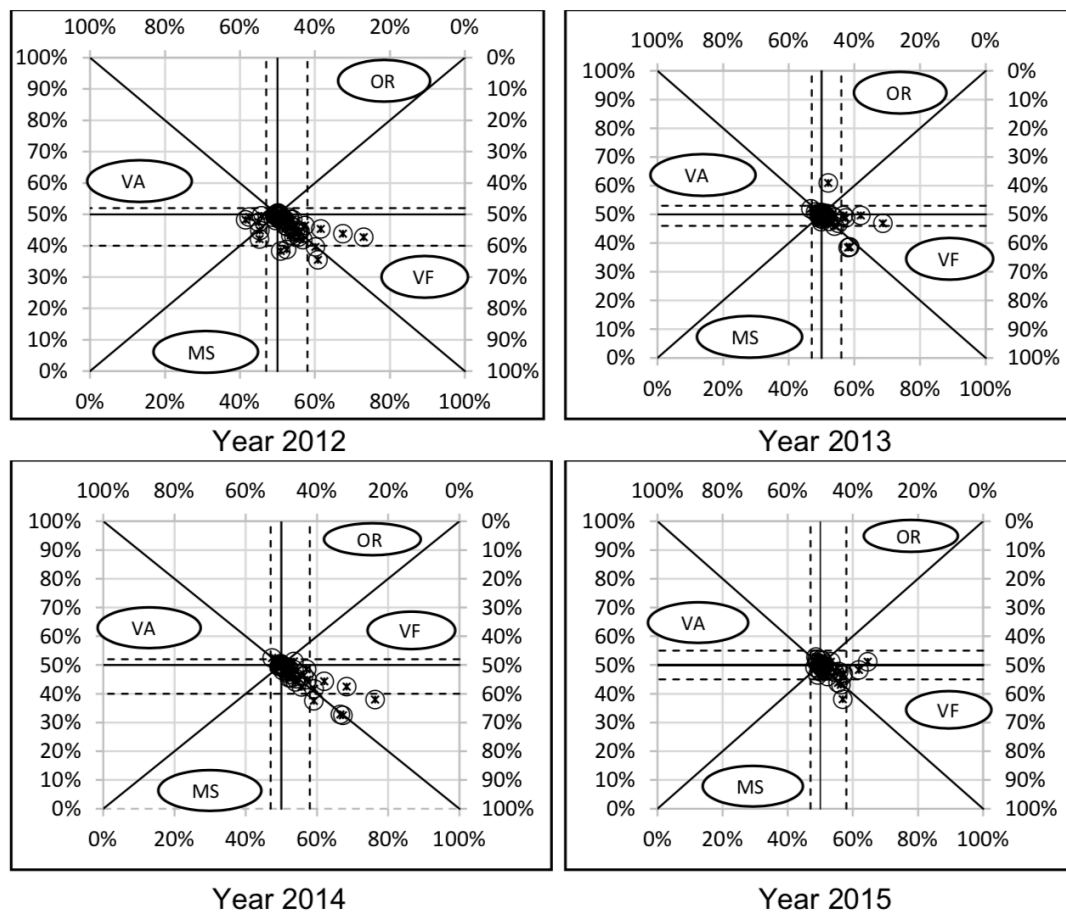
Figure 6. Annual Edgeworth Box

Table 10. Measures of accounting variable of equilibrium equation in figure 6

	2012	2013	2014	2015	2016	2017
VF Max	60%	54%	60%	55%	56%	53%
VF min	48%	47%	48%	45%	47%	47%
MS Max	58%	56%	58%	58%	55%	56%
MS min	47%	47%	47%	47%	47%	47%

The concentrated positions of banking activities in the center of the Edgeworth box in 2013 and 2017 justifies the high numbers of positions on CC area on table 9. These years are characterized by minimum levels on VF Max and MS Max. So, banks have difficulty to give credit to markets and they obtain less monetary savings from non-financial sectors. The best position of banking activity is on 2012 and 2014 because banks can give credit to market up to 60% (VF Max) and obtain monetary savings on 58% (MS Max), both percentages are the maximum values of these variables in the period of research. The result of evolution of banking activity says that banking activity in Southeast Asia has good behavior when VF Max (VF min) is higher than MS Max (MS min). Moreover, during all periods, banks have assured a 47% as minimum of monetary savings (MS min). So, the concentration of banking activity on the center of the Edgeworth box are resilience years, and when there is diversity of positions of banking companies in reference to the center of the Edgeworth box, there are less perturbations on markets.

3.2. The geographical banking activity.

The banking activity in Southeast Asia has the best positions in 2012 and 2014 and this section analyzes the relation between banking activity and macroeconomic variables. The macroeconomic variables are obtained from the World Bank and they are compared with the accounting indicator of the Edgeworth box Lambda (L) and Gamma (G) to explain the evolution of banking activity in Southeast Asian countries.

Table 11. Macroeconomic variables of World Bank

Description of variables	Code of variables
Broad money growth (annual %)	FM.LBL.BMNY.ZG
GDP growth (annual %)	NY.GDP.MKTP.KD.ZG
GDP per capita growth (annual %)	NY.GDP.PCAP.KD.ZG
Wage and salaried workers, total (% of total employment) (modeled ILO estimate)	SL.EMP.WORK.ZS
Data Source: World Development Indicators. Last Updated Date 18/10/2018	

The selected variables of table 11 take into account their relationship with the accounting principle of double entry in the theoretical accounting model of this manuscript. In order to compare them with the banking activity of Southeast Asian countries, the table 12 has their positions in the Edgeworth box.

Table 12. Positions of Southeast Asian banks in Edgeworth box

Countries/area	CC	CD	DD	DA	AA	AB	BB	BC	sum
IDFEB	54	11	15	104	77	19	15	25	320
TH	32	44	28	89	14	4	6	12	229
VN	11	5	11	99	28	0	6	13	173
PH	18	12	10	51	30	4	2	1	128
MY	3	2	4	7	39	11	3	5	74
SG	9	2	5	34	3	0	5	5	63
VNFEB	0	0	1	10	0	0	2	2	15
LAFEB	0	0	0	1	2	2	0	0	5
MM	1	0	0	0	4	0	0	0	5
	128	76	73	385	197	40	37	61	997

Acronym: ID: Indonesia. LA: Laos. MM: Myanmar.MY: Malaysia. PH: Philippines.SG: Singapore. TH: Thailand. VN Vietnam.

The acronyms of table 12 are codes of the Orbis data base and they are also the domain codes on the internet. Indonesia (ID) and Thailand (TH) have a high level of banking activity which is concentrated in the DA area of the Edgeworth box. This level of concentration on the DA area shows a continued period of resilience to get AA positions. The figure 7 presents levels of concentration by percentages in relation to total positions adopted by row of table 12.
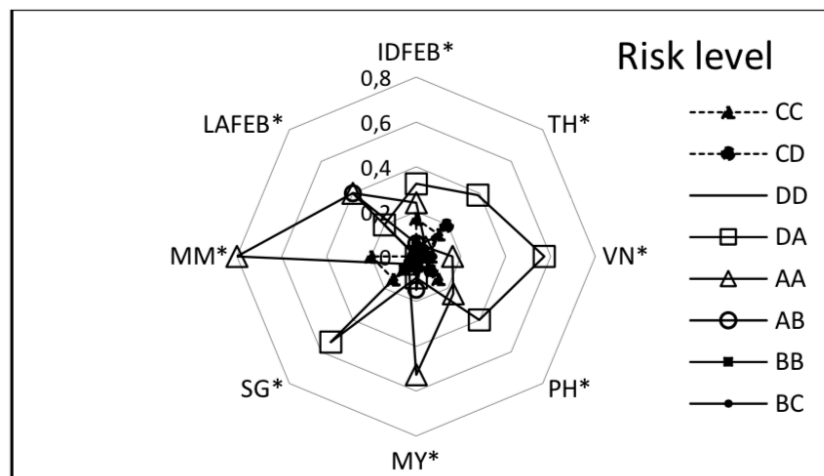

Figure 7. Relative position of banking activity by countries.

The order of positions in the Edgeworth box of banking activity in Southeast Asian countries on table 12 is descendent respect to sum-column, and by contrasting these results with percentages of figure 7, countries with high level of positions on table 12 are located on the DA area and countries with low level of positions adopt the AA area. The exception of Singapore does not allow us reaching some conclusions about the level of concentration or diversity on the number of banks in a country. So, by contrasting the behavior of banks with the evolution of L and G indicators, the assessment of banking activity in different countries is developed by an associated behavior of criterion of banks.

3.3. The associated behavior of banking activity

This section analyzes banking activities in every Southeast Asian country but considering the results of analysis on previous sections: (a) there is a relation among accounting indicators of AMEB and Basel Commission, (b) the banking activity is concentrated on the center of the Edgeworth box, (c) the 2014 year shows the best behavior of companies and (d) there is a diversity on banking activity in Southeast Asian countries in the period of research.

The contrasted evolutions of L and G indicators allows to build three groups of countries in several figures: figure 8 for Myanmar and Vietnam, figure 9 for Thailand and Malaysia and figure 10 for Philippines, Indonesia and Singapore. The aggregation of accounting variables of the equilibrium equation on each country has allowed the obtaining of L and G indicators, which are represented in the secondary y-axis in each figure with dashed lines. These indicators are contrasted with elasticity (Egb) of BM (Broad money) respect to GDP (Gross domestic product) and the annual variation of workers with level of employment (VW).

The elasticity of BM respect to GDP has been obtained contrasting macroeconomic variables of Broad money growth (annual %) (numerator) with GDP growth (annual %) (denominator), and its variation justifies the role of the first one on the evolution of the economy in a country. The decrease of Egb points out that the variation of GDP has not been supported by the variation of BM and the economic growth is not related to monetary polices. The contrasting of Egb with the variation of workers (VM) as well as its accumulated value (AcVW) justifies the effects of the macroeconomic behavior of a country. The consideration of the evolution of Ebg and VW, mainly this last one, enables the analyzing of the behavior of banking activity in each Southeast Asian country, as well as the justification of banking decisions. The Ebg and VW macroeconomic variables are not affected by criterion of value, and it allows to contrast them with all variables represented in each figure. The elasticity Ebg is divided by 100 (Egb/100) in order to be represented in the primary y-axes, and series of VW has the score (Δ) in black color (▲) when variations of workers (VW) have the same tendency as L and G indicator, with these taking them same color.

The evolutions of banking activity in Myanmar and Vietnam (figure 8) do not have any relation and they have independent behaviors compared to other Southeast Asian countries. The VW increases according to the variation of Egb before 2014, and in recent years (2017), VW decreases without relation to evolution of Egb. This scenario justifies that the banking activity of both countries is in the center of the Edgeworth box in the period of the analysis (2012 to 2017). The banking activity of Myanmar has difficulty in 2014 and maintains its position in the AA area in the center of the Edgeworth box because its activity is nondependent of the economic behavior of this country. The G indicator of the banking activity of Vietnam is adjusted by the evolution of the VW after 2014, and acquires the DA area in the center of the Edgeworth box in 2017, according to a bad evolution of VW. Nevertheless, Vietnam consolidates its level of employment (AcVW) better than Myanmar.
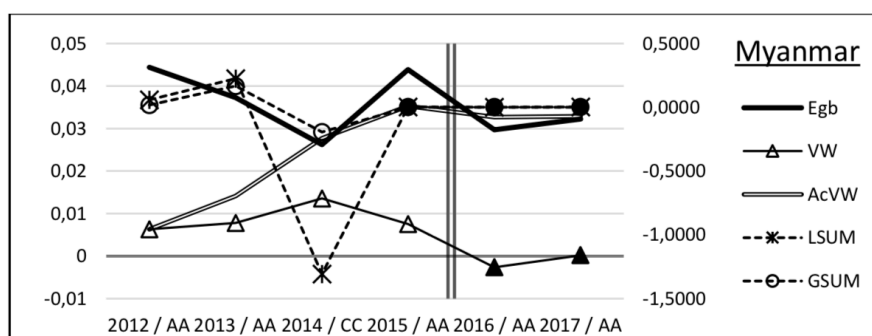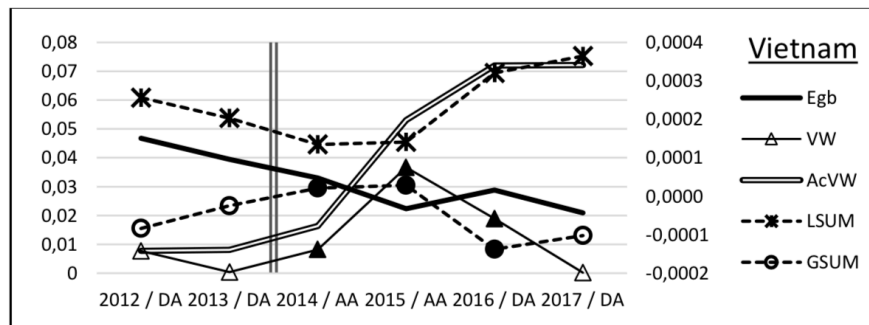
Figure 8. Banking activity in Myanmar (MM) and Vietnam (VN)

The banking activity in Malaysia and Thailand has similar behavior on figure 9. Nevertheless, their respective economies have different behaviors. Malaysia experiments an evolution of the VW without relation to the Egb variation after 2014, and the L indicator adjusts its evolution to the VW. The evolution of the VW in Thailand depends on the variation of Egb as well as the variation of the L indicator before 2015. After this year, the G indicator has same evolution of VW. The contrasting these different behaviors at end period of research Thailand get better level of employment than Malaysia, but Thailand has a higher risk position than Malaysia, which adopt a prudential position on center of Edgeworth box.
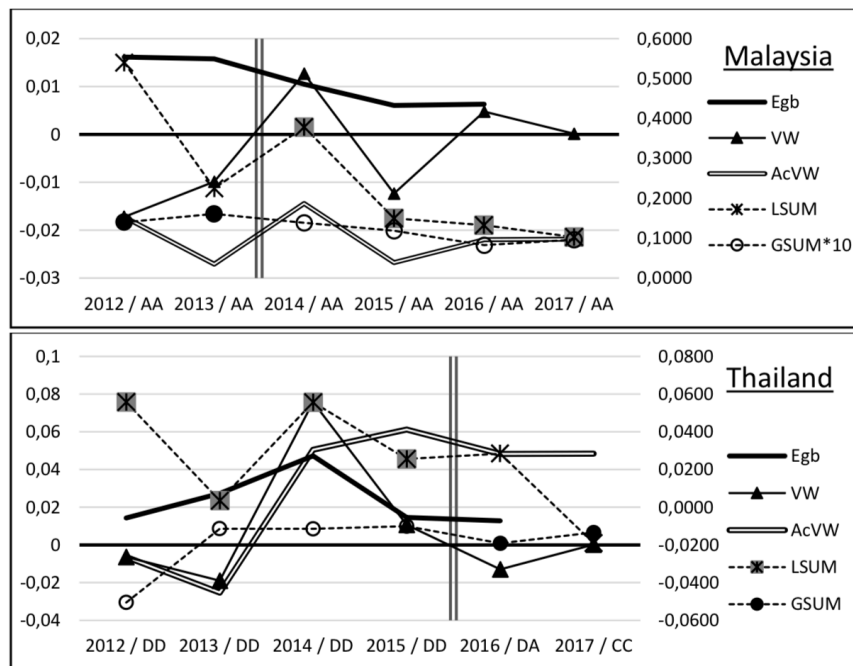

Figure 9. Banking activity in Malaysia (MY) and Thailand (TH)

The banking activity in Philippines, Indonesia and Singapore are represented in figure 10 and these countries have high numbers of position in Edgeworth box according results of table 9. Their elasticity (Egb) ranges around 2% in Indonesia and Singapore and adopts a lower level than 1% in Philippines. Nevertheless, Philippines gets a level of 4% on elasticity in 2103 and Singapore exceeds 3% of elasticity in 2016 justifying that their economies are supported by the broad money growth. So, this variable (Ebg) has more relation with L indicator than G indicator and it decreases (increases) when VW increases (decreases). These variations justify that banking activity be counterpart of activity of real economy, and the assessment of banking activity has relation with the evolution of workers (VW).

The evolution of L and G indicators is associated to increasing (decreasing) of workers (VW) when accounting indicators are approached (separated). According this criterion, Philippines do not abandon the optimal management positions of AA area, Indonesia gets improve its position in Edgeworth box at last years and Singapore maintain a prudential position (DA) along of period. The location of banking company in the Edgeworth

box Is on its center because the measuring of L and G indicator has reference on secondary y-axis and their values are around null value. So, the banks of countries adopt prudential positions and adjusting financial position (L indicator) to coverture their financial risk by economical positions (G indicator). This behavior supposes that banking companies adopt economic positions according to evolution of economic, which is measured by evolution of VW. The effect of covers the G indicator and the adjustment of the L indicator means that banks do not abandon resilience and safe positions.
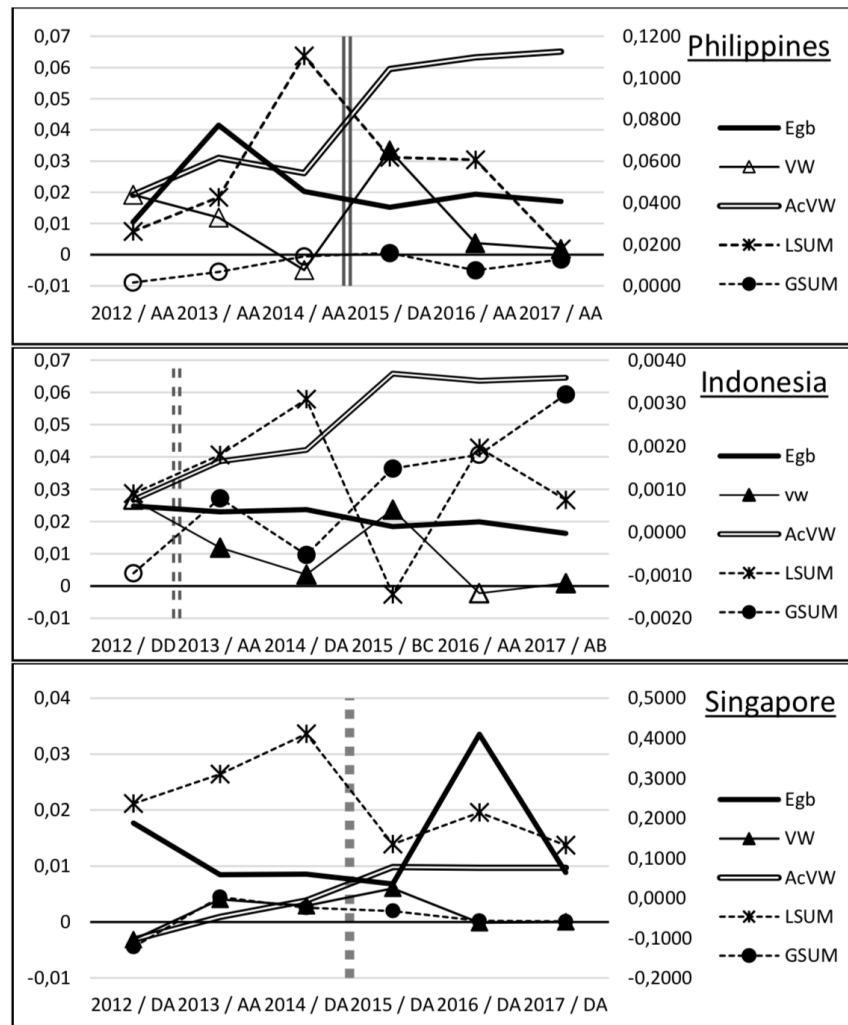

Figure 10. Banking activity in Philippines (PH), Indonesia (ID) and Singapore (SG)

The contrast of the results of banking activity by the accounting methodology over the Edgeworth box with annual reports of BIS, which results are on table 13, are similar but different. Considering the level of employment as a variable to measure the economic growth of a country, the banking activity has different adaptations in Southeast Asian countries. Malaysia has low levels of employment (AcVW) along of period, and the banking activity acquires a safe position in the center of the Edgeworth box by decreasing the credit given to markets, which is measured by L indicator. Vietnam, Philippines and Indonesia have the best position at the end of the period because they get a level of employment near 6,5% (AcVW). Vietnam and Philippines are on same longitude and latitude, but the banking activity has been developed with different strategies. Nevertheless, they have the same kind of behavior of both L and G

indicators. When these indicators adjust their positions and their differences become shorter (longer), the level of employment (VW) increases (decreases). So that, when there is difficulty in an economy, banks give credit to markets (increasing L) but this financial position is not covered by their economic positions (decreasing G) and the risk of banking activity rises. The banking activity in Indonesia has adopted the same strategy, but its economic

position (G indicator) covers the risk of financial positions (L indicator) and it is never located in an area of risk in the Edgeworth box. The behavior of the G indicator as a coverture of financial positions (G>L) explains the overcoming of the resilience period in this country.

Table 13. Early warning indicators far stress in domestic banking systems

County	Credit-to-GDP gap	Debt service ratio (DSR)	DSR if interest rates rise by 250 bp3
Asia 2014	19,9 (1)	2,4	4,4 (2)
Asia 2015	17,8 (1)	4, 1(amber)	6,3 (1)
Asia 2016	14 (1)	1,8	4,1(2)
Country 2017	**Credit-to-GDP gap**	**Debt service ratio (DSR)**	**DSR if interest rates rise by 250 bp3**
Thailand	11.3*(1)	-0.3	1.6
Malaysia	9,7 (2)	0,9	3,3
Indonesia	9.3*(2)	0.8	1.5
Legend	Credit/GDP gap>10 (1)	DSR>6 (1)	DSR>6 (1)
	2≤credit/GDP gap≤10 (2)	4≤DSR≤6 (2)	4≤DSR≤6 (2)
Country 2018	**Credit-to-GDP gap**	**Debt service ratio (DSR)**	**Cross-border claims to GDP**
Thailand	6.7*(2)	-0.6	-16.6
Malaysia	4.0*(2)	0.4*(2)	-1.6
Indonesia	6,9*(2)	0,5*(2)	-10.9
Legend	Credit/GDP gap≥9 (1)	DSR≥1.8 (1)	XB claims≥34 (1)
	4≤credit/GDP gap<9 (2)	0.1≤DSR<1.8 (2)	18≤XB claims<34 (2)

The cells also include asterisks (*). These refer to instances in which the combined behavior of the corresponding debt and property price indicators signal vulnerabilities. Asian includes Philip pines, Hong Kong RAE, Indonesia, Malaysia, Singapore y Thailand; and excluded Philippines and Singapore far DS R and your prevision. DS R: the debt service ratio is the ratio of debt service payments made by or due from a country to that country's export earnings. https://stats.oecd.org/glossary/ detail.asp?ID=562

By contrasting the results of table 13 with the assessment of the AMEB methodology, the banking activity improves from 2014 to 2018, but BIS does not consider what effect this credit behavior has on real economy. The Thailand's credit policy has a good position in 2018, while in 2017, it takes a bad position in the CC area, being in accordance to the BIS criteria (11,3). Malaysia's credit policy improves its level of risk on table 13, as it never abandons AA area, and Indonesia maintain its level of risk. According to the result obtained, the banking activity is a counter part of the economic market and it adjusts this behavior to the evolution of the real economy with different strategies.

4. Conclusion

The banking activity in Southeast Asian countries has different levels of associated behaviors, which has been measured by economic and financial indicators of the accounting methodology over the Edgeworth box. The annual variation of workers is a macroeconomic variable with an associated relation to accounting indicators of the Edgeworth box and it explains their evolutions. The banking activity improves its level of financial risk when its financial positions have the same evolution of the variation of workers, but the employment decreases. These scenarios are present in Myanmar and Malaysia. The level of employment increases when the banking activity adjusts its economic position to the evolution of the variation of workers. Nevertheless, banks of Vietnam, Thailand and Singapore cover their financial position negatively when the variation of workers are negative in the last year 2017. So, Thailand and Singapore adopt translational positions to overcome the resilience period, and Vietnam is in the area of financial risk of management in the Edgeworth box. So, banking activity is the counter part of economic behaviors in an accounting economic-financial model, and the elasticity of Broad money

regarding the variation of GDP, as well as annual variation of workers, are macroeconomic valid variables used to explain the behavior of banking activity.

The concentration of annual observations of banking activity in the center of the Edgeworth box means that there is difficulty to develop this activity in a country, and these years, where this event occurs, are resilience periods as well as safe positions in order to answer to perturbations of markets. This effect has been justified by comparing the accounting indicators of the Edgeworth box to indicators of the Bank of International Settlement throughout this manuscript. So, the accounting methodology over the Edgeworth box shows which alternative way a bank can adopt to overcome risks of management and not entering in contradiction to other measures of monetary governmental institutions.

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