

DIGITALES ARCHIV

ZBW – Leibniz-Informationszentrum Wirtschaft
ZBW – Leibniz Information Centre for Economics

Alfieri, Luca; Kokashvili, Nino

Book

Financial safety nets in East Asia and Europe : a political economy assessment

Provided in Cooperation with:

University of Tartu

Reference: Alfieri, Luca/Kokashvili, Nino (2020). Financial safety nets in East Asia and Europe : a political economy assessment. Tartu : The University of Tartu FEBA.

This Version is available at:
<http://hdl.handle.net/11159/4064>

Kontakt/Contact

ZBW – Leibniz-Informationszentrum Wirtschaft/Leibniz Information Centre for Economics
Düsternbrooker Weg 120
24105 Kiel (Germany)
E-Mail: [rights\[at\]zbw.eu](mailto:rights[at]zbw.eu)
<https://www.zbw.eu/econis-archiv/>

Standard-Nutzungsbedingungen:

Dieses Dokument darf zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden. Sie dürfen dieses Dokument nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, aufführen, vertreiben oder anderweitig nutzen. Sofern für das Dokument eine Open-Content-Lizenz verwendet wurde, so gelten abweichend von diesen Nutzungsbedingungen die in der Lizenz gewährten Nutzungsrechte.

<https://zbw.eu/econis-archiv/termsfuse>

Terms of use:

This document may be saved and copied for your personal and scholarly purposes. You are not to copy it for public or commercial purposes, to exhibit the document in public, to perform, distribute or otherwise use the document in public. If the document is made available under a Creative Commons Licence you may exercise further usage rights as specified in the licence.

University of Tartu
Faculty of Economics and Business Administration

**FINANCIAL SAFETY NETS IN EAST ASIA AND
EUROPE: A POLITICAL ECONOMY
ASSESSMENT**

Luca Alfieri, Nino Kokashvili

Tartu 2020

ISSN-L 1406-5967
ISSN 1736-8995
ISBN 978-9985-4-1203-9 (pdf)
The University of Tartu FEBA
<https://majandus.ut.ee/en/research/workingpapers>

Financial Safety Nets in East Asia and Europe: A Political Economy Assessment

Luca Alfieri, Nino Kokashvili*

Abstract

This article aims to measure and compare the voting power of the member states of two financial nets: the ASEAN Plus Three Macroeconomic Research Office (AMRO) - Chiang Mai Initiative Multilateralized (CMIM) and the European Stability Mechanism (ESM). Furthermore, the study observes the changes to the CMIM before and after the increase of its resources in 2012. The literature on the comparison between regional safety nets lacks proper evaluations from a political economy perspective. This work fills the gap in the literature by placing two of the most important and recent regional financial safety nets under scrutiny. The article employs empirical analyses using two typical measurements of voting systems such as the Shapley-Shubik and Banzhaf indices. The article shows that the small ASEAN countries, contrary to assumptions in the literature, have been penalised after changes in 2012. By observing simple voting weights only, these effects are not visible. However, based on the results obtained from Shapley-Shubik and the Banzhaf power measurements, we argue that the voting powers of big countries, such as Japan and China, have increased after the changes in the system in 2012. In contrast to the ASEAN example, results in the case of the ESM show that there are no substantial differences in the voting powers of member states based on the Banzhaf index and Shapley-Shubik Index. Based on the empirical results of the article, the authors suggest that AMRO-CMIM should take into account the ESM experience regarding the voting mechanism.

JEL Classification: F33, F36, F53

Keywords: Financial Safety Nets, Chang Mai Initiative, European Stability Mechanism, voting power.

* Luca Alfieri, PhD student, University of Tartu, Faculty of Economics and Business Administration, e-mail: luca.alfieri@ut.ee.

Nino Kokashvili, PhD student, University of Tartu, Faculty of Economics and Business Administration, e-mail: ninokokashvili92@gmail.com

The authors thank Kristian Pentus (University of Tartu), Kadri Ukrainski (University of Tartu), Urmas Varblane (University of Tartu), Tiiu Paas (University of Tartu), Jaan Masso (University of Tartu), Gaýgysyz Ashyrov (University of Tartu), Diana Gabrielyan (University of Tartu) for their feedback. We are solely responsible for all errors and omissions.

1. INTRODUCTION

After the end of the Bretton Woods system and the financial crisis of 2007/2008, the global financial safety net evolved from a centralised global level of intervention to a more articulated multi-layered system. The Global Safety Net (e.g. International Monetary Fund (IMF)), other global institutions, Regional Safety Nets (i.e. the European Stability Mechanism and the Chiang Mai Initiative) and bilateral arrangements (especially bilateral swap lines among foreigner central banks) exist together and try to find a consistent framework (Krings and Grimes, 2019; Rana, 2017; McKay et al., 2011).

The aim of this article is to evaluate from a political economy perspective two of the most important regional safety nets:¹ the European Stability Mechanism (ESM) and the system composed by the Chiang Mai Initiative Multilateralized (CMIM) and ASEAN Plus Three² Macroeconomic Research Office (AMRO).

The European Stability Mechanism is one of the most recent regional financial safety nets and the most important in terms of economic significance and innovative relations with the IMF. The history of regional financial agreements in Europe is strictly connected with the European monetary integration process (Rhee et al., 2013). Indeed, the creation of the ESM and establishment of other components of the European regional safety net, such as the European Financial Stabilisation Mechanism (EFSM) and the European Financial Stability Facility (EFSF), were consequences of the Eurozone crisis.

The creation of the Chiang Mai Initiative, ASEAN Plus Three Macroeconomic Research Office (AMRO) and their developments in the last decades represent a topic of interest for economists (Mühlich and Fritz, 2018; Rana, 2017; Kwai, 2015; Capannelli, 2011) and political scientists (Krings and Grimes, 2019; Grimes, 2011; Katada, 2009). Previous studies have focused especially on the reactions to the crisis of the CMIM financial safety net, the limits of the initiative itself, its possible future evolution taking into account the increasing importance of the AMRO, and the relationships with the International Monetary Fund (Krings and Grimes, 2019; Mühlich and Fritz, 2018; Rana, 2017; Kwai, 2015; McKay et al., 2011). Currently, there exists no studies that have focused on assessing the voting powers of the different countries from a quantitative methodological perspective. There are only a few general considerations of the topic, especially on discussions related to the power of China and Japan within the Initiative (Krings and Grimes, 2019; Kwai, 2015).

There exists a large body of literature about the comparison of regional safety nets. However, previous works have mainly focused on the different tools and the amount of funds available (McKay et al., 2011), eventual relations with the IMF (Krings and Grimes, 2019; Mühlich and Fritz, 2018; Rana, 2017; McKay et al., 2011) and timing in delivering liquidities (Fritz and Mühlich, 2019; Mühlich and Fritz, 2018; McKay et al., 2011). Even though certain studies have also compared the different governance and decision-making systems, they have normally focalised only on the asymmetry of the economic sizes of the members (Fritz and Mühlich, 2019; Mühlich and Fritz, 2018), and the problem of impartiality that is derived from the presence (or not) of a veto power or a well understood dominance (Rana, 2017; McKay et al.,

¹ A regional safety net (also known as a regional financing arrangement or RFA) can be defined, following McKay et al. (2011), as an arrangement among a group of countries that rely each other to a mutual financial support system in case of balance of payments problems¹.

² ASEAN Plus Three is composed by the ASEAN countries plus China, South Korea and Japan.

2011).

The contributions of this article to the literature are as follows: First, using political economy tools (power indices), it assesses the voting powers of the European Stability Mechanism and the Chiang Mai Initiative for the first time, which provides new perspectives from the political economy point of view. Second, the article enlarges the typologies of possible methods of comparison among regional safety nets presenting the possibility of applying more quantitative methods. Third, the article presents new policy recommendations and suggestions for improving AMRO-CMIM, considering the European experience.

The work measures the voting powers of the member states of these regional arrangements, taking into account two well-known indices of political economy literature: the Shapley-Shubik Index (Shapley and Shubik, 1954) and the Banzhaf index (Banzhaf, 1965). Moreover, the study observes the changes to AMRO-CMIM before and after the decision to increase its resources in 2012. The data used for the estimation is taken from Capannelli (2011) and Capannelli and Tan (2014). The data for the European Stability Mechanism is taken directly from ESM web sources.

The results show that small ASEAN countries, contrary to assumptions in previous literature (Kwai, 2015), are not reinforced by the new changes on quotas of 2012 but they are, in reality, penalised. Moreover, the real voting powers of Japan and China have increased after the changes in 2012. This effect is not visible by only taking into account the simple voting weights; however, the results differ when the Shapley-Shubik and the Banzhaf indices are applied.

The empirical results for the ESM do not show any substantial differences in the voting powers of member states either based on the Banzhaf or Shapley-Shubik Index. These findings indicate that the ESM represents a potential benchmark in terms of “impartiality” for financial nets. This result is consistent with conclusions made by Rana (2017). However, the estimations of this article provide a clearer confirmation of the assumption made by the previous author (Rana, 2017), as the results are based on more quantitative analysis.

Hence, the authors suggest the AMRO-CMIM system take into account the ESM experience not only concerning its different relations with the International Monetary Fund (Rana, 2017) but also in terms of its voting mechanism. This aspect is especially important in case the de-linked proportion of the liquidity and the power of AMRO continue to improve in forthcoming years as foreseen and requested by the majority of the literature (Mühlich and Fritz, 2018; Rana, 2017; Kwai, 2015). However, the main challenge related to improving the system is associated with the requirement of changes in the current policies of China and Japan. This obstacle is also pointed out by Krings and Grimes (2019).

The article is organised as follows. In the first part of the work we introduce the literature on the AMRO-CMIM system and the ESM, an overview of the other regional safety nets, and the related comparative studies. In the second part, the authors explore the political economy studies on international and regional organisations, the Shapley-Shubik and the Banzhaf indices and their applications, and explain the methodology applied to the cases of AMRO-CMIM and the ESM. In the third part, the authors present the results of the analysis, as well as comment, discuss and suggest possible policy implications taking into account the results and arguments from previous literature on regional safety nets.

2. LITERATURE REVIEW

2.1 THE REGIONAL SAFETY NETS IN EUROPE AND EAST ASIA

The ESM

The ESM was set up in 2012 with the purpose of making permanent the three facilities of the The European Financial Stability Facility (EFSF)³ and to increase the amount of total usable resources up to almost one trillion euros. With resources immediately available amounting to 500 billion euros (700 billion considering the ESM plus the EFSF), the ESM is the most resourceful regional safety net in the world.

The member states of the ESM contribute with authorised capital based on respective shares of the EU total population and GDP. The principal decision-making committee is represented by the Board of Governors and the Board of Directors. The Board of Governors comprises representatives of the 19 member states (Eurozone countries). The European Commission and the European Central Bank send their representatives as observers. The chief of the Board is the president of the Eurogroup.⁴

The Board of directors is also composed from the 19 ESM member countries. Representatives from The European Commission and the European Central Bank assist as observers. The directors are appointed by the Governors. The chair is the ESM managing director. The decisions in both committees are taken by a qualified majority of 80%. The votes are equal to the number of shares of the capital stock of the ESM of the member countries.

Although there exists a strict collaboration between the IMF and ESM, the European system is still considered to be independent (Rana, 2017; Rhee et al., 2013). At the same time, the ESM's loans are conditioned by macroeconomic adjustment programmes. This is one of the reasons why the ESM has only been used three times since the year of its establishment until the present time: partially in Spain in 2012, in the case of the Cyprus crisis in 2013, and for the last assistance programme in Greece in 2015.⁵

The CMI

After the Asian crisis of 1997–1998, the increase of reserves was not considered to be a sufficient protection tool from East Asian countries (McKibbin and Chanthapun, 2009). Kwai (2015) argues that the countries of the area realised the importance of economic and financial interconnections and the problem of total dependence on the IMF for the resolution of the

³ The history of the European regional financial safety net system starts with the Short-Term Monetary Support (STMS) in 1970 and the Medium-Term Financial Assistance (MFTA). The evolution of this system is interconnected with the process of the economic and monetary integration of the European Union (Rhee et al. 2013) and its crisis. Indeed, the system composed by the EFSM, the EFSF and, lastly, the ESM was triggered by the recent global financial crisis and the Eurozone crisis. The EFSF was created as a temporary tool in 2010 for providing loans to countries with limited access to the financial markets due to the crisis (especially Greece). The EFSF still exists legally but it can no longer provide loans. However it can issue bonds³. The EFSM had the duty to provide assistance to EU countries that had financial difficulties using bonds guaranteed by the European Union. The EFSM still performs some specific duties but, as the EFSF, most of its competencies passed to the ESM.

⁴ <https://www.esm.europa.eu/esm-governance>

⁵ <https://www.esm.europa.eu/about-us/history>

crisis,⁶ which created the necessity of establishing a regional framework for preventing and managing other possible regional crises. As a result, the regional financial framework composed by a regional liquidity support facility (the CMI), the Asian Bond Market Initiative (ABMI), and a regional economic surveillance system – the Economic Review and Policy Dialogue (ERPD) – were created.

The new regional framework aimed to solve the challenges related to the lack of liquidity during the crisis, the dependence on the US dollar and the risk of contagion due to the increasing economic interdependence of the region. The CMI, launched in 2000, was initially a system of bilateral swap agreements (BSAs) between the Plus Three countries and some of the ASEAN countries, and the ASEAN Swap Arrangement (ASA) that has existed already since 1977 in the ASEAN framework.

The Evolution of the CMI

The CMI and the ASEAN Plus Three countries decided to multilateralise the CMI by creating the Multilateralized Chiang Mai Initiative with an amount of 120 billion dollars and by increasing the amount of money (not submitted to IMF control) from 20% to 30%.

In 2012, a new agreement was made to double the total amount of resources to 240 billion dollars. The increase came into effect in 2014. Furthermore, in 2014 the CMIM Precautionary Line (CMIM-PL), a crisis prevention facility, was introduced. This line was added to the existing CMIM Stability Facility (CMIM-SF), which has crisis resolution functions. The contributions of the “Plus Three” count for 80% of the total amount. The members of ASEAN contribute 20%. On the other hand, the “Plus Three” countries cannot borrow more than 50% of the contributions while five countries of the ASEAN with the smallest economies are allowed to borrow five times their contribution. In addition, these countries have greater voting power considering their individual contributions.

Several authors suggest the innovation of the decision-making systems to be quite important (Capannelli and Tan, 2014). One of the most crucial changes is the possibility to decide on the basis of the qualified majority of two-thirds of the votes instead by a consensus. Such a change presently only concerns operating decisions, especially swap activation (Krings and Grimes, 2019), but an enlargement of the issues submitted to the decision system is possible in the near future, especially if the system continues the process of de-link from the IMF.

AMRO

AMRO was established in 2011. Its initial function was to support the ERPD and help the CMI’s decision-making processes. AMRO’s objective is to identify exposures and to support the evolution of principal macroeconomic and financial indicators to avoid the problem of moral hazard, related to unconditional financing, and to assure that the members of the CMIM will be able to repay their borrowings (Capannelli 2011).

The increased importance of AMRO in the regional framework can be observed by looking into the willingness of the ASEAN Plus Three authorities to enhance the collaboration between

⁶ See Kawai (2015) for more information on IMF misjudgements.

AMRO and other important international economic institutions⁷ and its transformation in a real international organisation in 2016. AMRO is an important part of the system not only for the macro surveillance of the area and advice to the countries of ASEAN Plus Three, but also in case of emergencies in a crisis and the lack of a real secretary of the CMIM, the Executive Committee of AMRO acts as its secretariat de facto. AMRO decides whether a country is able to receive help and conducts the modality and delivery of funds. The regional supervisor control system presents advantages: it works at a lower level, thus increasing trust between member countries and makes the directives more acceptable for the members (Sa, 2011). In 2016, AMRO became a real regional organisation, which reinforced AMRO's authority and increased the interest of its role in the current system.

Many scholars underline weaknesses and discuss the limits of the AMRO-CMIM system. In terms of CMIM, various researchers claim that the amount of money does not have sufficient effect in a crisis, even when it is the largest among the regional safety nets in the world in absolute value (Hill and Menon, 2014). Indeed, the countries are seen to be unable (or do not have the willingness) to exploit the present system. Instead, bilateral agreements that involve some major countries in the area like South Korea and Japan or the USA are preferred (Kwai, 2015). Moreover, the role of the IMF is contested by various authors and supporters of the present regional framework. Many scholars suggest a real Asian Monetary Fund (Kwai 2015), while others, such as Chutikamoltham (2017), more modestly, think a complementary relationship with the IMF is better. Rana (2017) suggests that, looking at the European experience, it would be beneficial to establish a new relationship between the East Asia safety net and the IMF. Furthermore, AMRO's resources in terms of expertise are considered insufficient for the present scope and for the possible future competencies (Rana, 2017; Hill and Menon, 2014).

2.2 COMPARISON OF THE EAST ASIAN AND EUROPEAN REGIONAL SAFETY NETS

In the last decade, after the Great Recession, new regional safety nets were created or reinforced. Subsequently, there exists increased interest from scholars and academics in those safety nets as a financial stabilisation tool against crisis. At the same time, the main topics of discussion for various scholars in the field are the relations between regional safety nets and the Global safety nets (especially the IMF).

McKay et al. (2011) provides a comparison of the regional safety nets.⁸ Their article (McKay et al., 2011) considers the CMIM as the most impartial among the regional safety nets. Such a

⁷ AMRO signed the Memorandum of Understanding (MoU) with the ESM and IMF to strengthen their collaboration. Moreover, AMRO obtained the position as a permanent observer at the United Nations General Assembly. See <https://amro-asia.org/about-amro/who-we-are/#governance>

⁸ They consider different aspects of the safety nets, they call them "optimum financing criteria". The criteria are:

- The amount of the financing pool or resources accessible;
- Timely access to important information;
- The quality of expertise in the different regional safety nets;
- The speed in the decision-making of the safety net;
- The impartiality in lending and other decisions (that concerns the problem of power asymmetry in decisions);
- The mechanisms for monitoring and enforcing conditionality.

conclusion is due not only to the presence of the IMF quota of disbursed loans, but also to the presence of no veto power and the common interest to prevent a crisis with the risk of a spill over effect in the region. Furthermore, McKay et al. (2011) underlines that the RFAs are more useful for small and medium-sized countries.

Rana (2017) in a recent analysis takes into account the new European system and stresses its impartial mechanism. However, the study observes a high level of impartiality in case of the AMRO-CMIM system as well. The author agrees with the previous literature in regard to the fact that small countries are better protected by regional financial safety nets. Similarly, Mühlich and Fritz (2018) also discuss Regional Safety Nets as a beneficial arrangement for small economies. In the case of the AMRO-CMIM system, both articles stress the increased use of different bilateral swaps in East Asia due to the presence of the IMF conditionality over 30% of the loans. The literature agrees on the limits of these bilateral agreements (Mühlich and Fritz, 2018; Chutikamoltham, 2017), especially for smaller countries.

In their recent work, Krings and Grimes (2019) have analysed the institutional design of the FLAR and AMRO-CMIM systems. The article observes that both regional nets should be considered more as “nested” than “parallel”⁹ institutions considering their relations with the IMF. However, the work also underlines that those systems have the potential “to leave the nest” and become parallel institutions.

The institutional design research of Krings and Grimes (2019) adds a new methodological perspective to the literature that compares regional safety nets. However, the paper is constructed using the semi-structured interview technique. In fact, a large portion of the present works on the topic are based on qualitative and/or descriptive analysis (Fritz and Mühlich, 2019; Mühlich and Fritz, 2018; Rana, 2017; Rhee et al., 2013). Clear quantitative empirical analyses in the field are seldom documented and such a methodological approach provides the potential to find new insights.

The AMRO-CMIM and ESM systems are among the most recent financial safety nets with the greatest resources available at the present time. The main difference between the two resides not only in the total amount in absolute value but also the reduced power in the decision-making of the IMF in the ESM. Table 1 provides a summary of the decision structures and voting mechanisms for AMRO-CMIM and ESM. While the European system represents a well-integrated economic environment, at the same time, the East Asian one shows shallow integration pushed by market forces (Capanelli 2011). Such a development, along with the instable economic framework, provides the relevance of the IMF in East Asia. As a result, the progressive detachments from the IMF conditionality is also very slow.¹⁰ McKay et al. (2011), on the other hand, stress that due the presence of overly large economies, such as China and Japan, the AMRO-CMIM system may potentially become the most independent (from IMF) regional safety net in the world. The hidden potentialities of the AMRO-CMIM system in this sense are pointed out also in the recent work by Krings and Grimes (2019).

⁹ The concept of “nested” and “parallel” institutions derived from the work of Aggarwl (1998). Basically, the main idea is to analyse the linkages of new or adapted institutions have a parallel (that can be even substitutive) or nested connection with pre-existing institutions.

¹⁰ We can observe this considering the still postponed increase in the amount of lending services de-linked from IMF conditionality from 30% to 40%.

3. METHODOLOGY

In the literature, two major measures of voting power exist: the Shapley-Shubik power index and the Banzhaf power index (Badinger et al., 2013). Even though some scholars consider that differences between those two approaches are marginal in many cases (Lindner and Machover, 2004; Lindner, 2008), sometimes the results from using them differ significantly (Paterson, 2007). In this article we concentrate on both power measures.

3.1 THE SHAPLEY-SHUBIK POWER INDEX

The Shapley value is a single-valued solution concept for coalitional games introduced by Shapley in 1953. It awards every coalitional game compensation which represents the payoff that each player can expect to obtain from participating in the game. The compensation is a function of its marginal contribution.

The Shapley value can be used to measure the power of every member in a decision-making process. The index can visualise some power distributions that are not evident from a more superficial analysis. Players with the same preferences can form coalitions. Each coalition that has enough votes to succeed is called a winning coalition, and the others are called losing coalitions. The Shapley and Shubik index, considering the above description of the Shapley value, tells us that the power of a coalition is not just proportional to its size. The real power of a coalition is measured by the fraction of the possible voting sequences in which that coalition casts the deciding vote; that is, the vote that first guarantees a win or a loss.

The power index is normalised between 0 and 1. A power of 0 means that a coalition has no effect at all on the outcome of the game (if S and $S \cup \{i\}$ are both winning coalitions or both losing coalitions); and a power of 1 means a coalition determines the outcome by its vote (if S is a losing coalition, and $S \cup \{i\}$ is a winning coalition). The sum of the powers of all the players is also always equal to 1.

The Shapley-Shubik index can be formulated as follows:

$$\text{Shi}(N; v) = \sum \{S \subseteq N : S \cup \{i\} \text{ winning}, S \text{ losing}\} \frac{|S|! \times (n - |S| - 1)!}{n!}$$

The index shows that for every ordering of the players there is just one player such that the set of all the players before him in the sequence are a losing coalition, and if he joins the coalition he changes this coalition into a winning coalition. This player is called a pivotal player. The arguments for or against a proposal are directed especially to the pivotal player because his vote can affect the vote of the subsequent players. If the number of proposals to be decided is large, and they induce all possible orderings of the players with the same probabilities, the Shapley-Shubik power index of player i is the probability that player i will be a pivotal player. The index measures the power of each player thanks to this deeper analysis. For additional information about the properties of the Shapley-Shubik index please see Appendix 1.

3.2 THE BANZHAF POWER INDEX

The Banzhaf power index, originally invented by Pensore in 1946,¹¹ is a widely accepted measure of voting power, along with the alternative Shapley-Shubik value. The index can be used to measure the power of every member in a decision-making process.

The main difference between the two indices lies in the procedure of how votes are taken. While the Shapley-Shubik measure is used when votes are taken in sequence, the Banzhaf index is applied when voters are independent in their choices and votes are taken simultaneously. In the Banzhaf model the underlying poll distribution is binomial with a probability of $\frac{1}{2}$, while in the Shapley-Shubik model it is uniform or “random” (Baldwin et al., 2003).

The Banzhaf voting power index is given by $B_i(v) = (B_1(v), \dots, B_n(v))$ where

$$B_i(v) = \frac{1}{2^{n-1}} \sum_{S \subset N | i \in S} [v(S) - v(S \setminus \{i\})]$$

The normalised Banzhaf index denoted by $\bar{B}_i(v)$ is given by the following normalisation:

$$\bar{B}_i(v) = \frac{B_i(v)}{\sum_{k \in N} B_k(v)}$$

The Banzhaf power index shows that the voting situation depends on the number of ways in which each voter can have an impact on a “swing” in the outcome (Shapley & Dubey, 1979). In other words, the Banzhaf index shows the ability of the voter to change the election outcome.

3.3 EMPIRICAL LITERATURE ON PREVIOUS APPLICATIONS OF THE SHAPLEY-SHUBIK AND BANZHAF POWER INDICES

The Shapley-Shubik and Banzhaf indices are among the most widely used voting power measures in political economy (La Porta et al., 1999; Leech, 2002a). These classical indices have been previously applied to measure the power of the members of various voting games including, the voting power of political parties (Holler, 1982; Brams and Kilgour, 1988) and the power of players inside the decision-making bodies of different institutions (Lucas, 1983).

Empirical studies involving power indices have often been combined with the model of ownership control described in Leech (1987; 2002a) to explain the influence of power in decision-making and shareholder behaviour.

The Banzhaf index has been applied to calculate shareholder voting power for corporate governance among large British companies (Leech, 2001). Similarly, Berle and Means (1967) have investigated real weighted voting games and ownership in large American corporations using the Banzhaf and Shapley-Shubik indices. Pohjola (1988) has applied the same methodology in the case of Finnish companies.

¹¹ The index is often referred to as the Penrose–Banzhaf index.

One of the most useful applications of the Shapley-Shubik and Banzhaf indices has been devoted to studies of large international organisations whose system of governance is based on voting (La Porta et al., 1999; Leech, 2002a). The Shapley-Shubik and Banzhaf indices have been used to understand the effects of recent developments in the European political environment. They have also been applied to measure the impact of the exit of any member state from the EU on the power distributions among member nations of the Union (Koczy, 2016).

The Banzhaf index has been used to measure the voting power of the International Monetary Fund (IMF) (Leech, 2002a) and the Qualified Majority Voting system in the Council of the European Union (Leech, 2002b). The Shapley-Shubik power index has been used to predict the influence over decisions in many political (Felsenthal and Machover, 1998), juridical (Casajus et al., 2009) and economic (La Porta et al., 1999; Leech, 2002a; Leech, 2002b) applications of the European Union (Geller et al., 2013). At the same time, the Shapley-Shubik power index has been used to study the judicial behaviour in the Supreme Court of the United States (Johnson, 1977).

3.4 TESTING THE MCMI USING SHAPLEY-SHUBIK AND BANZHAF POWER INDICES

This chapter aims to demonstrate that the voting powers of member states of the MCMI differ from simple voting weights under the Shapley-Shubik and Banzhaf power indices. Moreover, the authors test whether the changes due to the total increased size of the MCMI fund in 2012 to an amount of 240 billion dollars impact the voting powers.

The authors calculate the Shapley-Shubik and Banzhaf power indices based on the voting weights of member states before and after the innovation of the CMI (see Table 2 and Table 3 in the annex). The authors consider the MCMI vote for its operational function using qualified majority and the weights of the votes so as to avoid a veto from China, Japan and ASEAN as a whole (Table 2).

The vote from China plus Hong Kong has the same weight as the vote from Japan and ASEAN as a whole (Table 2). Considering the institutional weakness of the ASEAN structure, it is possible that member countries will not always vote in the same way (Grimes, 2011). It will be interesting to observe the different power of each country considering them one by one.

We use the program SSdirect created by the University of Warwick¹² and programming techniques to calculate the fundamental definition of the Shapley-Shubik index and Banzhaf, respectively. The number of players (13) is optimal considering the specificities of this program. The data used for the estimation is taken from Capannelli (2011) and Capannelli and Tan (2014).

First, we calculate the Shapley-Shubik index and the Banzhaf index before the total size of the MCMI is increased to 240 billion dollars and we input the following data:

- Number of players = 13¹³
- Quota for the qualified majority of two-thirds = 106

¹² <http://homepages.warwick.ac.uk/~ecaae/ssdirect.html>

¹³ We consider China and Hong Kong as a whole.

- The weights of each player considering the “total number of votes” column in Table 2.¹⁴

Second, we calculate the Shapley-Shubik index and the Banzhaf index for the changed MCMI and we replace the previous data with the following:

- Number of players = 13
- Quota for the qualified majority of two-thirds = 211
- The weights of each player considering the “total number of votes” column in Table 3.

3.5 TESTING THE ESM USING SHAPLEY-SHUBIK AND BANZHAF POWER INDICES

In this section, the authors test the voting powers of the ESM using the Shapley value and Banzhaf index. The voting rights of each ESM member country, as exercised by its appointee or by the latter's representative on the Board of Governors or Board of Directors, is equal to the number of shares allocated to it in the authorised capital stock of the ESM. Therefore, to calculate the Shapley-Shubik index and the Banzhaf index for the ESM, we use following data:

- Number of players = 19
- Quota = 80%
- Number of shares allocated in the authorised capital stock.

The authors use the program SSdirect created by the University of Warwick¹⁵ and programming techniques (python) to calculate the fundamental definition of the Shapley-Shubik and Banzhaf index, respectively. The number of players (19) is optimal considering the specificities of this program. The data for the European Stability Mechanism is taken directly from ESM web sources.

¹⁴ All the data of the weight and the quota are approximated as integers.

¹⁵ <http://homepages.warwick.ac.uk/~ecaee/ssdirect.html>

4. RESULTS

4.1 RESULTS FOR THE MCMI

The Shapley-Shubik and Banzhaf power indices (measured in the article) are presented in Table 3 for the member countries of the MCMI before and after the innovation of the voting system in 2012. The results show that there exists a significant difference between the distribution of voting power (power indices) among the countries and the simple voting weights. For example, in the case of China and Cambodia, the authors find greater voting power with the Shapley-Shubik index (Chinese vote counts more than 54.79 times the Cambodian vote) than considering just the total number of votes (40 versus 1.72 so the Chinese vote counts 23.25 times more than the Cambodian vote).

Measuring the Shapley-Shubik index before the innovation of the MCMI shows us that even until 2012, the weighted shares of the member states did not reflect their exact voting power; this is especially true for large countries: China and Japan (Figure 1 and Figure 2). While the simple weight shares for China and Japan before the innovation are 28% each, in reality their voting power reaches 39% (Shapley value). The opposite tendency is evident for smaller nations. The voting power of small countries (Vietnam, Thailand, Singapore, Philippines, Malaysia, Brunei, Indonesia and even the Republic of Korea) based on the Shapley-Shubik measure are lower than stated in their weighted shares before the innovation of the system in 2012 (Figure 1 and Figure 2). Kawai (2015) also points out precisely the same problem before the innovation of the MCMI system, to increase the voice of smaller countries. Therefore, among various other reasons that led to the changes in the decision-making system of the MCMI in 2012, the issue of voting power distribution is also important.

Even though the transformation of the decision-making body of the MCMI in 2012 was significant, still change to the real voting power of the smaller countries is not clear. While the results show that simple voting powers as measured by simple voting weights for the member countries differ from the voting powers measured on the basis of power indices, at the same time, those differences have widened after the reform in 2012. The results indicate the changes in both Shapley-Shubik index and Banzhaf index after the increase to 240 billion dollars in the MCIM (see figures 1 and 2 and Table 3). It is important to underline that, while the situation in Korea and the rich ASEAN countries is better, considering their voting power, at the same time, this does not hold for the small economies of the ASEAN bloc. In fact, in the case of Cambodia and China, after the innovation, the total number of votes for China remains 23.25 times the total number of votes for Cambodia. The difference is even larger using the power indices. Considering the Shapley-Shubik index, the voting power of China is 84.40 times the voting power of Cambodia.

After the innovation in 2012, the Shapley-Shubik index shows that the increase in weighted shares for smaller countries does not necessarily strengthen their real voting power (Table 2). For example, for countries such as Vietnam, Myanmar, Laos, Cambodia and Brunei, the weighting powers have increased slightly after 2012; however, their Shapley values are smaller compared to the situation before the changes in the decision-making system. The only major change that is evident based on our measurements is that the real voting power has increased significantly for the Republic of Korea. At the same time, small changes (increases in voting

power) are visible for Philippines, Singapore, Thailand and Malaysia. However, the problem of vote distribution between smaller and larger nations remains an unsolved challenge for the MCMI.

Considering the results (Table 2, Figure 2) and the possibility that a qualified majority vote will be implemented in other issues or competences in the coming years, it will be necessary to revise the total number of votes attributed to each member to avoid the power of countries like China and Japan increasing too much in comparison with the smallest economies like Myanmar and Cambodia.

In addition, the results indicate that, considering the present situation, an agreement with China and Japan cannot be excluded in certain cases of common economic interest (Grimes, 2011). These two countries have very considerable power if they combine their total number of votes and their voting power computed using the Shapley-Shubik index. A better distribution of votes to favour the smallest economies would be desirable. At the same time, the results of the Banzhaf index are closer to the vote shares of the member countries, which is logical due to the fact that the Banzhaf index does not consider political ties between member states. However, the Banzhaf index also shows how all the states did not improve their situation after 2012 (except Vietnam) in comparison with China and Japan.

4.2 RESULTS FOR THE ESM

The Shapley-Shubik and Banzhaf power indices (measured in the article) are presented in Table 3 and Figure 5 for the member countries of the ESM. The results show that there exist no differences between the distribution of voting powers (power indices) among the countries and their weights. The power indices (Shapley-Shubik index and Banzhaf index) are similar in their values with weight shares.

Taking into account this result, we can say that in the case of the ESM, vote share distribution in the decision-making system is not problematic. The vote shares of the members states of the ESM are allocated in such a way that the coalition formation of the decision-making system is also reflected in this distribution. Therefore, in the case of the ESM, the vote shares reflect the real voting power of the member states.

5. CONCLUSIONS

The article has made the following contributions to the literature. In the first part of the article, the authors created a useful summary of recent developments and challenges related to regional safety nets, including a description of the ESM and the AMRO-CMIM systems, their evolution and decision-making mechanisms. The authors then discussed other regional safety nets in the world and provide a comparison of them according to various aspects.

In the second part, the authors describe the theory of the Shapley value, its application with the Shapley-Shubik and Banzhaf power indices and their usage in previous literature. The authors underline the benefits of the power indices, their properties and discussed differences between them. The authors then compute the Shapley-Shubik index and Banzhaf index for each member country in the ESM and the MCMI.

In the third part of the article, empirical results are presented. The Shapley-Shubik index was applied to the MCMI weight of 13 member countries shows a larger difference in voting power between the largest and smallest economies (Figure 1, Table 2). The results of the Shapley value are slightly different from a simple observation of the total number of votes per country (Figure 1). At the same time, the results of the Banzhaf index are closer to the vote shares of the member countries, which is logical as the Banzhaf index does not consider political ties between member states. On the other hand, no significant differences can be seen in the case of the EMS. Looking at the Shapley and Banzhaf indices and the voting weights for the member countries in the ESM, the results are similar in their values.

The results of the article indicate that the European experience could be useful for the Asian example, not only in the ways already suggested by previous literature¹⁶ but also in terms of the fairness of the distribution of voting power. The relatively greater experience in voting systems for supranational institutions and previous studies on voting powers related to European institutions (Petróczy, 2018; Antonakakis et al., 2014; Varela and Prado-Dominguez, 2012) are possible explanations of the difference between the European and East Asian regional safety nets.

While safety nets could be seen as a remedy for smaller, more fragile financial systems, the findings of the article show that the voting outcomes might be quite the opposite. This also adds a caveat to the literature that implies how small countries are generally more comfortable in a regional safety net (Mühlich and Fritz, 2018; Rana, 2017; McKay et al., 2011). Moreover, recent literature suggests that in the case of a total replacement of the IMF functions by regional institutions, the regional institutions themselves have to impose conditional rules (Mühlich and Fritz, 2018). In this case, less asymmetry of voting power becomes essential. Asymmetric power and conditionality rules could greatly reduce the willingness of the small countries to use the regional mechanism even if the IMF authority is excluded from the East Asian system. In this sense, the analysis by Kring and Grimes (2019), which predicts favourable changes in the CMIM and the progressive departure from the IMF with the assumption of responsibilities from the larger powers, should be considered more cautiously. Moreover, Hill and Menon (2014) suggest that a proper division of responsibilities and a greater coordination of AMRO-CMIM and the IMF would make Japan and China (basically represent the “creditors”) more prone to support the mechanism. However, even if such improvements are welcomed, they still do not solve the problem of the “debtors” facing the issue of the greater voting power of the largest economies.

The possibility of delaying an eventual future decision on the part of the big countries and exploiting their voting power is another weak point in the AMRO-CMIM arrangement. The lack of decision-making speed in cases of liquidity crises could further undermine the use of the AMRO-CMIM system and compromise the credibility of the arrangement.¹⁷ Furthermore, as noticed by Rhee et al. (2013), the CMIM has no paid-in capital resources in contrast to ESM, which raises additional doubts on the capacities of the CMIM to react quickly to crises. Such challenges could be even more deleterious considering the results of the power indices.

¹⁶ An example is the relation between EU’s institutions and the IMF (Rana, 2017, Rhee et al. 2013).

¹⁷ The problem of decision-making speed was also emphasized by Hill and Menon (2014), albeit from a different perspective.

Findings of this article are closely related to issues pointed out by Hill and Menon (2014). All the countries of the ASEAN Plus Three, including the smallest economies, have to contribute to the rescue of other countries in difficulty and their contribution to the funds is quite high in comparison to their reserves. In the case of the high risk of contagion, the relative costs of rescuing other countries will become high for the smallest economies. Hill and Menon (2014) report that there is an opt-out clause to avoid such a situation but this requires either extreme circumstances or a vote of the Executive Committee. Considering the results of this article, a situation may be triggered where the larger economies would be able to transfer higher relative weights of the cost of bail-outs to smaller economies.

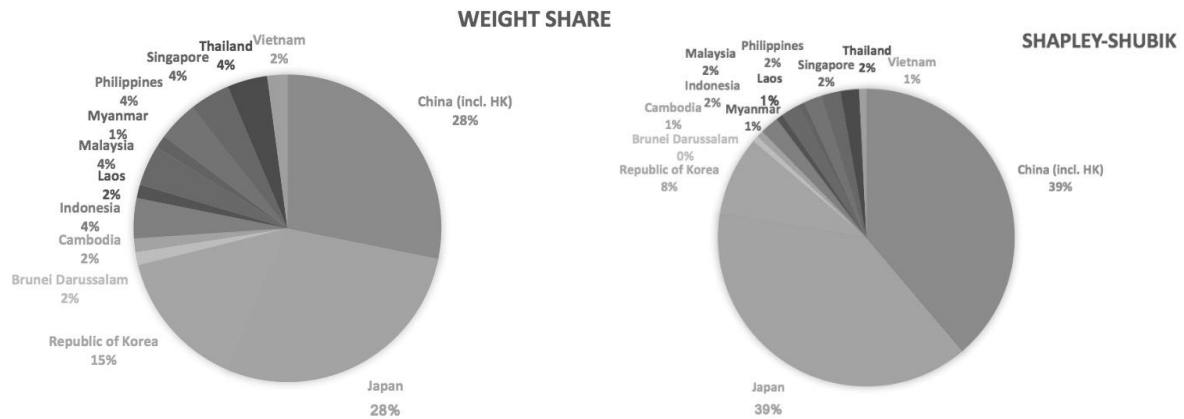
In the case of an enlargement of these issues, policy advisers should consider how to deliver greater voting power to the smallest economies to avoid excessive difference of voting power, which cannot be compensated for with the possibility of these small economies being liable for a larger share of the borrowing (in relation to their contribution) than the larger economies like China and Japan. The issue becomes more relevant as detachment from the IMF continues due to the existence of a conditionality system. The risk of an asymmetry of power and conditional rule is expected to further reduce the usage of the regional safety net by some East Asian countries.

The possibility of a one-time alliance, especially in the case of a crisis, between China and Japan, further stresses the voting power of these two countries. Looking at the European experience could improve the present East Asian situation in new ways that previous literature has failed to foresee.

TABLES AND FIGURES

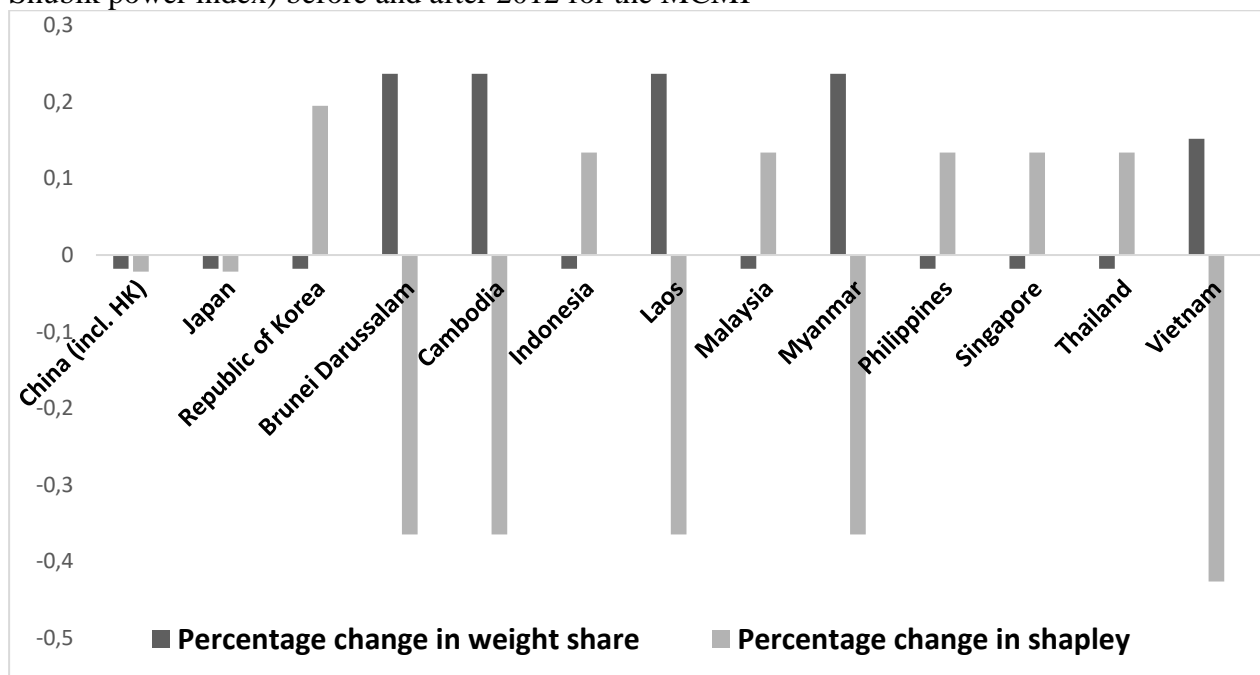
FIGURES

Figure 1. Weight shares (first pie chart) and Voting power, Shapley power index (second pie chart) for the member states before the innovation of the MCMI



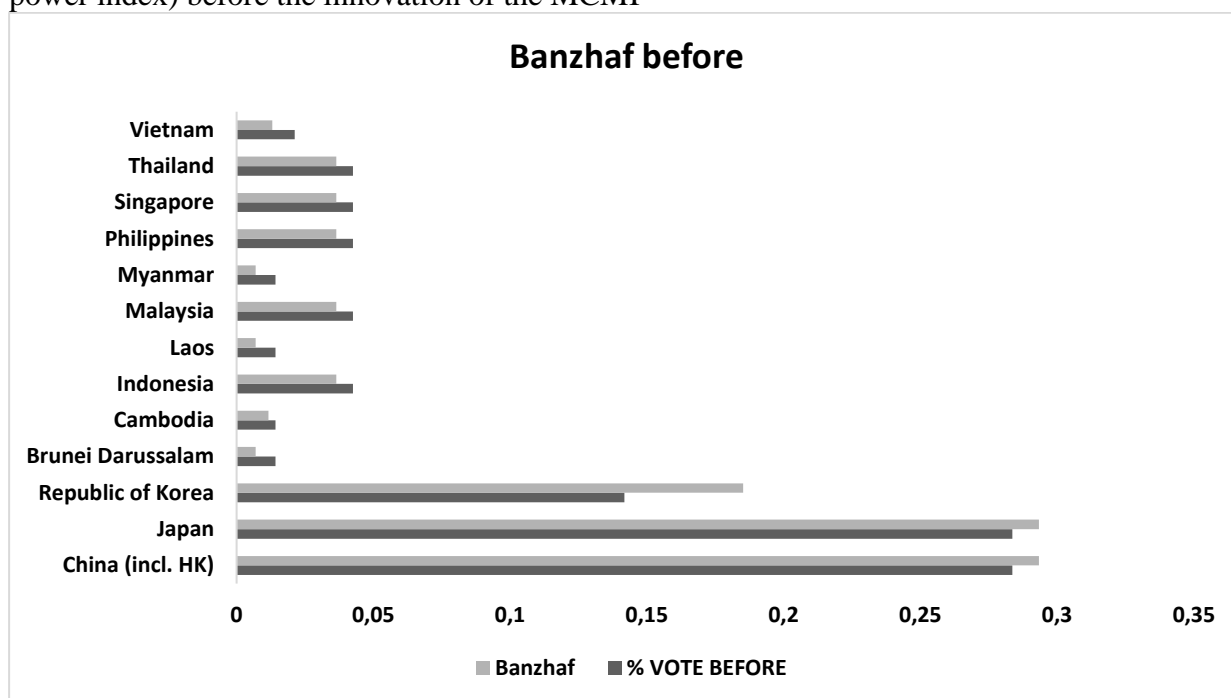
Source: Authors' own calculations

Figure 2. Comparison of percentage changes in weight shares and voting power (Shapley-Shubik power index) before and after 2012 for the MCMI



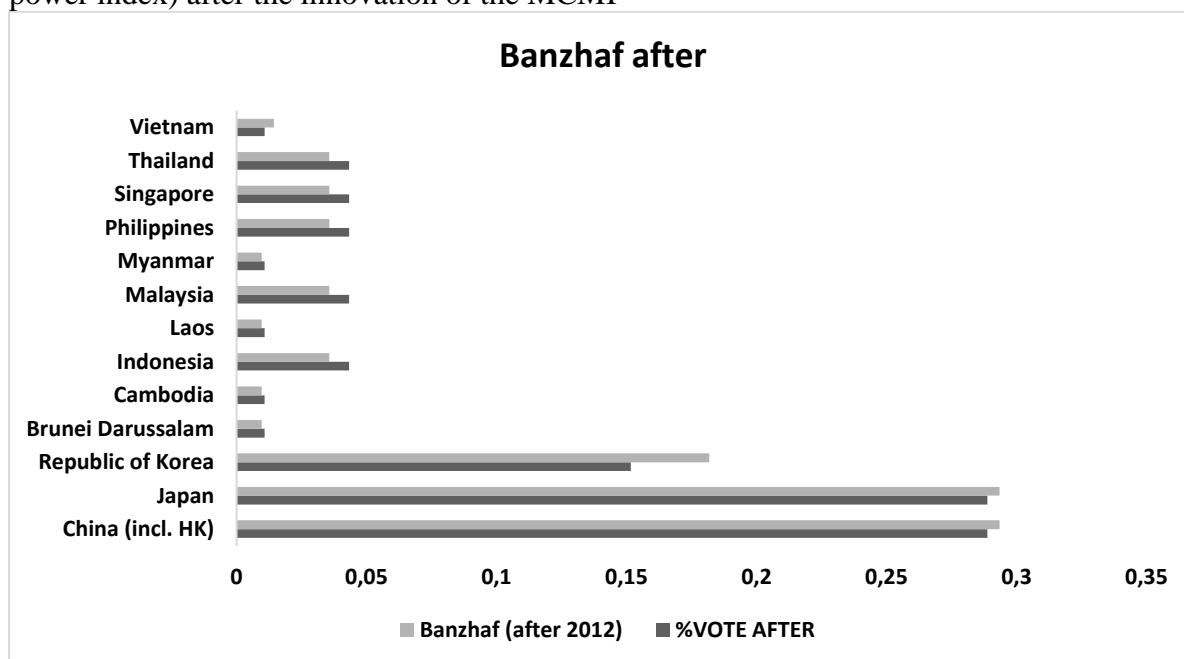
Source: Authors' own calculations

Figure 3. Comparison of percentage changes in weight shares and voting power (Banzhaf power index) before the innovation of the MCMI

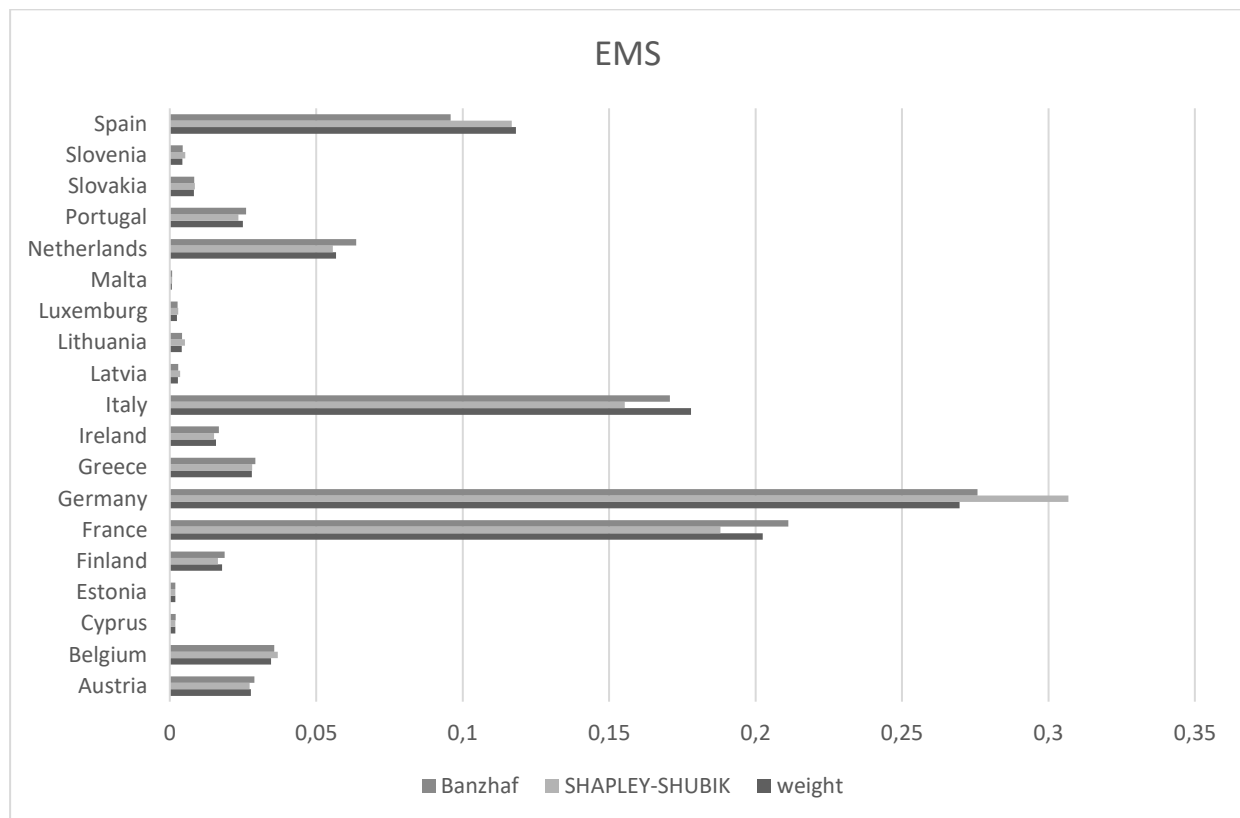


Source: Authors' own calculations

Figure 4. Comparison of percentage changes in weight shares and voting power (Banzhaf power index) after the innovation of the MCMI



Source: Authors' own calculations

Figure 5. Comparison of weight shares and voting powers for member states in the EMS

Source: Authors' own calculations

TABLES

Table 1. Summary of the decision structure and voting mechanisms of the ESM and AMRO-MCMI

ESM	AMRO-MCMI
Total usable resources: 1 trillion dollars (Immediately available 500 billion).	Total usable resources: 240 billion dollars.
Strict collaboration with IMF but basically independent.	Only 30% of the resources are not submitted to IMF supervision.
Principal decision-making committees: Board of Governors and the Board of Directors.	Principal decision-making committee: Executive Committee of AMRO. It acts as secretariat de facto.
Capital based on respective share of EU total population and GDP.	Contributions of the "Plus Three" countries count for 80% of the total amount. "Plus Three" countries cannot borrow more than 50% of contributions while five countries of ASEAN with the smallest economies can borrow five times their contribution.
Most of the decisions in both the committees taken at qualified majority of 80%.	Most of the decisions taken at qualified majority of the 2/3 of the quotas.
Number of countries: 19.	Number of countries: 13.

Table 2. Shapley-Shubik and Banzhaf power indices for the member countries of the MCMI before and after the innovation of the decision-making system in 2012

Countries	Weight share	Weight share (after 2012)	Shapley-Shubik	Shapley-Shubik (After 2012)	Banzhaf	Banzhaf (after 2012)
China (incl. HK)	0.281690141	0.286738351	0.387885	0.379494	0.29344	0.29356
Japan	0.281690141	0.286738351	0.387885	0.379494	0.29344	0.29356
Republic of Korea	0.147887324	0.150537634	0.08648	0.103341	0.18522	0.1818
Brunei Darussalam	0.014084507	0.010752688	0.007079	0.004496	0.00691	0.00967
Cambodia	0.014084507	0.010752688	0.007079	0.004496	0.01168	0.00967
Indonesia	0.042253521	0.043010753	0.020319	0.023038	0.03647	0.0356
Laos	0.014084507	0.010752688	0.007079	0.004496	0.00691	0.00967
Malaysia	0.042253521	0.043010753	0.020319	0.023038	0.03647	0.0356
Myanmar	0.014084507	0.010752688	0.007079	0.004496	0.00691	0.00967
Philippines	0.042253521	0.043010753	0.020319	0.023038	0.03647	0.0356
Singapore	0.042253521	0.043010753	0.020319	0.023038	0.03647	0.0356
Thailand	0.042253521	0.043010753	0.020319	0.023038	0.03647	0.0356
Vietnam	0.021126761	0.017921147	0.007837	0.004496	0.01311	0.01438

Source: Authors' own calculations

Table 3. Shapley-Shubik and Banzhaf power indices for the member countries of the ESM

ESM Members	Weights (according to shares)	SHAPLEY-SHUBIK	Banzhaf
Austria	0.027644489	0.027293	0.028880565
Belgium	0.034534258	0.036884	0.035674238
Cyprus	0.001948642	0.00193	0.001998139
Estonia	0.001847336	0.001864	0.001914635
Finland	0.017851622	0.016409	0.018776542
France	0.202471003	0.187976	0.21119435
Germany	0.269615707	0.306883	0.275838622
Greece	0.027975222	0.028073	0.029268264
Ireland	0.015813593	0.015079	0.016754545
Italy	0.177917326	0.155366	0.170766331
Latvia	0.00274589	0.003517	0.002904757
Lithuania	0.00406272	0.005142	0.004216968
Luxembourg	0.002486951	0.002926	0.002618457
Malta	0.000726023	0.00076	0.000811185
Netherlands	0.056780752	0.055719	0.063701866
Portugal	0.024921158	0.023394	0.026041418
Slovakia	0.008183897	0.008589	0.00830868
Slovenia	0.004246886	0.005251	0.0044138
Spain	0.118226523	0.116717	0.095916639

Source: Authors' own calculations

REFERENCES

- Aggarwal, V. K. (1998) *Institutional Designs for a Complex World: Bargaining, Linkages, and Nesting*. Ithaca, NY: Cornell University Press.
- Antonakakis, N., H. Badinger and W. H. Reuter (2014) 'From Rome to Lisbon and Beyond: Member States Power, Efficiency and Proportionality in the EU Council of Ministers,' Working Paper no. 175. Vienna: Vienna University of Economics and Business, Department of Economics. Retrieved from <https://epub.wu.ac.at/4164/1/wp175.pdf>
- Badinger, H., M. Mühlböck, E. Nindl and W. H. Reuter (2014) 'Theoretical vs. Empirical Power Indices: Do Preferences Matter?', *European Journal of Political Economy*, 36: 158-176.
- Banzhaf, J. F. (1965). 'Weighted Voting Doesn't Work: A Mathematical Analysis', *Rutgers Law Review*. 19(2): 317–343.
- Berle, A. and G. Means (1968) *The modern corporation and private property* (2nd edition). New York, NY: McMillan.
- Brams, S. and D. M. Kilgour (1988) *Game theory and national security*. New York: Basil Blackwell
- Capannelli, G. (2011) 'Institutions for Economic and Financial Integration in Asia: Trends and Prospects', ADBI Working Paper, n° 308. Tokyo: Asian Development Bank Institute.
- Capannelli, G. and S. S. Tan. (2014) 'Institutions for Asian Integration: Innovation and Reform', ADBI Working Paper, n° 375. Tokyo: Asian Development Bank Institute.
- Casajus, A., H. Labrenz and T. Hiller (2009) 'Majority Shareholder Protection by Variable Qualified Majority Rules', *European Journal of Law and Economics*, 28(1): 9-18.
- Chutikamoltham S. (2017) 'Effectiveness of Regional Mechanisms for Multilateral and Regional Governance', ADBI Working Paper No. 719, April. Tokyo: Asian Development Bank Institute.
- Felsenthal, D.S. and M. Machover (1998) *The Measurement of Voting Power*, Cheltenham: Edward Elgar Publishing.
- Fritz, B. and L. Mühlich (2019) 'Regional Financial Arrangements in the Global Financial Safety Net: The Arab Monetary Fund and the Eurasian Fund for Stabilization and Development'. *Development and Change*, 50(1): 96–121.
- Geller, C.R., J. Mustard and R. Shahwan (2013) 'Focused Power: Experiments, the Shapley-Shubik Power Index, and Focal Points', Economics Discussion Papers (No. 2013-42).
- Grimes, W.W. (2011) 'The Asian Monetary Fund Reborn? Implications of Chiang Mai Initiative Multilateralization' *Asia Policy*, 11(1): 79-104.

- Hill, H. and J. Menon (2014) 'Financial Safety Nets in Asia: Genesis, Evolution, Adequacy and Way Forward', in M. Kawai, P.J. Morgan and P.B. Rana (eds) *The Global Economic Architecture: The Asian Perspective*, pp. 83–111. Cheltenham: Edward Elgar Publishing.
- Holler, M.J. (1982) 'Forming Coalitions and Measuring Voting Power', *Political studies*, 30(2): 262-271.
- Johnson, P.E. (1977) 'The Supreme Court of California 1975-1976 Foreword: The Accidental Decision and How It Happens', *California Law Review*, 65: 231-254.
- Katada, S.N. (2009) 'Political Economy of East Asian Regional Integration and Cooperation. ADBI Working Paper', n° 170. Tokyo: Asian Development Bank Institute.
- Kawai, M. (2015) 'From the Chiang Mai Initiative to an Asian Monetary Fund'. ADBI Working Paper No. 527. Tokyo: Asian Development Bank Institute.
- Kóczy, L.Á. (2016) 'How Brexit Affects European Union Power Distribution', Working Paper Series 1601. Budapest: Óbuda University, Keleti Faculty of Business and Management. Available at: <http://uniobuda.hu/users/vecseya/RePEc/pkk/wpaper/1601.pdf>
- Krings, W.W. and W. Grimes (2019) 'Leaving the Nest: The Rise of Regional Financial Arrangements and the Future of Global Governance', *Development and Change*, 50(1):72-95.
- La Porta, R., F. Lopez-de-Silanes and A. Shleifer (1999) 'Corporate Ownership around the World', *The Journal of Finance*, 54(2): 471-517.
- Leech, D. (1987) 'Ownership Concentration and Control in Large US Corporations in the 1930s: An Analysis of the TNEC Sample'. *The Journal of Industrial Economics*, 35(3): 333-342.
- Leech, D., (2001) 'Shareholder Voting Power and Corporate Governance: A Study of Large British Companies', *Nordic Journal of Political Economy*, 27(1): 33-54.
- Leech, D. (2002a) 'Designing the Voting System for the Council of the European Union', *Public Choice*, 113(3-4): 437-464.
- Leech, D. (2002b) 'Voting Power in the Governance of the International Monetary Fund', *Annals of Operations Research*, 109(1-4): 375-397.
- Lindner, I. and M. Machover (2004) 'L.S. Penrose's Limit Theorem: Proof of Some Special Cases', *Mathematical Social Sciences*, 47(1): 37-49.
- Lindner, I. (2008) 'A Special Case of Penrose's Limit Theorem when Abstention is Allowed', *Theory and Decision*, 64(4): 495-518.
- Lucas, W.F. (1983) 'Measuring Power in Weighted Voting Systems', in W.F. Lucas, S.J. Brams and P.D. Jr. Straffin (eds) *Political and related models*, pp. 183-238. New York, NY: Springer.

McKibbin, W. and W.P. Chanthapun (2009) 'Exchange Rate Regimes in the Asia-Pacific Region and the Global Financial Crisis'. Working Paper on Regional Economic Integration, n° 36 ADB. Manila: Asian Development Bank.

McKay, J., Volz U. and R. Wolfinger (2011) 'Regional Financing Arrangements and the Stability of the International Monetary System', *Journal of Globalization and Development* 2(1): 1-33.

Mühlich, L. and B. Fritz (2018) 'Safety for Whom? The Scattered Global Financial Safety Net and the Role of Regional Financial Arrangements', *Open Economies Review*, 29(5): 981–1001.

Paterson, I. (2007) 'Voting Power Derives from the Poll Distribution: Shedding Light on Contentious Issues of Weighted Votes and the Constitutional Treaty'. ENEPRI Working Paper, No. 50, 6 February. Available at: [<http://aei.pitt.edu/7394/>]

Petróczy, D. G., M. F. Rogers, and L. Á. Kóczy (2018) 'Brexit: The Belated Threat', Papers 1808.05142, arXiv.org.

Pohjola, M. (1988) 'Concentration of shareholder voting power in Finnish industrial companies'. *The Scandinavian Journal of Economics*, 90(2):245-253.

Rana, P. B. (2017). 'The evolving multilayered global financial safety net: The case of the Association of Southeast Asian Nations+3 regional sinancial safety net and the International Monetary Fund'. ADBI Working Paper, No. 733, May. Tokyo: Asian Development Bank Institute.

Rhee, C., Sumulong L. and Vallée S. (2013). 'Global and Regional Financial Safety Nets: Lessons from Europe and Asia'. Bruegel Working Paper 2013/06. Brugel: Bruxelles.

Shapley, L., S. (1953). 'A Value for n-person Games', in H.W. Kuhn and A. W.Tucker (eds) *Contributions to the Theory of Games*, volume II, v. 28, pp. 307– 317. Princeton , NJ: Princeton University Press.

Shapley, L.S. and Shubik, M. (1954). 'A Method for Evaluating the Distribution of Power in a Committee System', *American Political Science Review*, 48 (3):787–792.

Varela D. and J. Prado-Dominguez (2012). 'Negotiating the Lisbon Treaty: Redistribution, Efficiency and Power Indices', *Czech Economic Review*, Charles University Prague, Faculty of Social Sciences, Institute of Economic Studies, 6(2);107-124

APPENDICES

Appendix 1 –The Shapley value in detail

The Shapley value is a unique solution concept having the following properties:

1. The efficiency property

$$\sum_{i \in N} \varphi_i(N; v) = v(N)$$

Let ϕ be a single-valued solution concept, let $(N; v)$ be a coalitional game, and let $i \in N$ be a player. Then $\phi_i(N; v)$ is called the value of player i in $(N; v)$ according to ϕ . The coalition that will form is the grand coalition N . The total sum that the players expect to receive is $v(N)$, the total amount available to them, and we assume that rational players will distribute the entire total sum. We consider that nobody wastes part of it.

2. Symmetry property

$$\varphi_i(N; v) = \varphi_j(N; v)$$

This property is a non-discrimination property such that two players with the same standing in the game should expect the same amount (they differ only in their names). Let $(N; v)$ be a coalitional game, and $i, j \in N$. Players i and j are symmetrical players; if for every coalition $S \subseteq N \setminus \{i, j\}$ (which contains neither i nor j as members). The players are symmetrical, so they give the same marginal contribution to every coalition that does not contain them. Since they are identical from a strategic point of view, if we add player i to a coalition, it is equal to adding player j to that coalition.

3. The *null player* property

$$v(S) = v(S \cup \{i\})$$

If a player gives no contributions to any coalition he joins, then he should not expect to obtain a positive amount even if he participates in the game. Player i is named a null player in game $(N; v)$ if for every coalition $S \subseteq N$, including the empty coalition.

A single-valued solution concept ϕ satisfies the null player property if for each coalitional game $(N; v)$ and every null player i in the game:

$$\varphi_i(N; v) = 0$$

4. The *additivity* property

This tells us that if we combine two coalitional games described by two different functions v and w , the compensation distributed will correspond to the compensation derived from v sums to that derived from w such that:

$$\varphi(N; v+w) = \varphi(N; v) + \varphi(N; w)$$

Appendix 2 – MCIM data

Table 4. Contributions, borrowing multipliers, and voting power under the Multilateralized Chiang Mai Initiative (before total size increase to 240 billion of dollars)

Members	Financial Contributions		Borrowing arrangements		Voting Power			
	\$ billion	% share	Multiplier	Quota (\$ billion)	No. of basic votes	No. of votes based on contributions	Total no. of votes	% share
PRC, Hong Kong, China	38.40	32.00					40.00	28.41
<i>PRC</i>	<i>34.20</i>	<i>28.50</i>	0.50	17.10	1.60	34.20	35.80	25.43
<i>Hong Kong, China</i>	<i>4.20</i>	<i>3.50</i>	2.50	10.50	0.00	4.20	4.20	2.98
Japan	38.40	32.00	0.50	19.20	1.60	38.40	40.00	28.41
Republic of Korea	19.20	16.00	1.00	19.20	1.60	19.20	20.80	14.77
Plus Three Countries	96.00	80.00			4.80	96.00	100.80	71.59
Brunei Darussalam	0.03	0.03	5.00	0.20	1.60	0.03	1.63	1.16
Cambodia	0.12	0.10	5.00	0.60	1.60	0.12	1.72	1.22
Indonesia	4.55	3.79	2.50	11.36	1.60	4.55	6.15	4.37
Laos	0.03	0.03	5.00	0.20	1.60	0.03	1.63	1.16
Malaysia	4.55	3.79	2.50	11.36	1.60	4.55	6.15	4.37
Myanmar	0.06	0.05	5.00	0.30	1.60	0.06	1.66	1.18
Philippines	4.55	3.79	2.50	11.36	1.60	4.55	6.15	4.37
Singapore	4.55	3.79	2.50	11.36	1.60	4.55	6.15	4.37
Thailand	4.55	3.79	2.50	11.36	1.60	4.55	6.15	4.37
Vietnam	1.00	0.83	5.00	5.00	1.60	1.00	2.60	1.85
ASEAN	24.00	20.00			16.00	24.00	40.00	28.41
ASEAN+3	120.00	100.00			20.80	120.00	140.80	100.00

Source: Capannelli (2011)

Table 5. Contributions, borrowing multipliers, and voting power under the Multilateralized Chiang Mai Initiative (after total size increase to 240 billion of dollars)

Members	Financial Contributions		Borrowing arrangements		Voting Power			
	\$ billion	% share	Multiplier	Quota (\$ billion)	No. of basic votes	No. of votes based on contributions	Total no. of votes	% share
PRC, Hong Kong, China	76.800	32.000						28.410
<i>PRC</i>	<i>68.400</i>	<i>28.500</i>	0.50	34.20	3.200	68.400	71.600	25.430
<i>Hong Kong, China</i>	<i>8.400</i>	<i>3.500</i>	2.50	6.30	0.000	8.400	8.400	2.980
Japan	76.800	32.000	0.50	38.40	3.200	76.800	80.000	28.410
Republic of Korea	38.400	16.000	1.00	38.40	3.200	38.400	41.600	14.770
Plus Three Countries	192.000	80.000			9.600	192.000	201.600	71.590
Brunei Darussalam	0.060	0.025	5.00	0.30	3.200	0.060	3.260	1.158
Cambodia	0.240	0.100	5.00	1.20	3.200	0.240	3.440	1.222
Indonesia	9.104	3.793	2.50	22.76	3.200	9.104	12.300	4.369
Laos	0.060	0.025	5.00	0.30	3.200	0.060	3.260	1.158
Malaysia	9.104	3.793	2.50	22.76	3.200	9.104	12.300	4.369
Myanmar	0.120	0.050	5.00	0.60	3.200	0.120	3.320	1.179
Philippines	9.104	3.793	2.50	22.76	3.200	9.104	12.300	4.369
Singapore	9.104	3.793	2.50	22.76	3.200	9.104	12.300	4.369
Thailand	9.104	3.793	2.50	22.76	3.200	9.104	12.300	4.369
Vietnam	2.000	0.833	5.00	10.00	3.200	2.000	5.200	1.847
ASEAN	48.00	20.00			32.00	48.00	80.00	28.41
ASEAN+3	240.00	100.00			41.60	240.00	281.60	100.00

Source: Capannelli and Tan (2014)

Appendix 4 -The global crises and other problems related to East Asian financial nets

The global financial crisis of 2007-09 showed the limits of the initial framework. The crisis affected all the countries of the area through trade channels (Kawai 2015) but also created a shortage of liquidity in certain countries like South Korea and Indonesia.

The financial and currency crisis that affected South Korea in 2007–2008 did not push the country to ask for help from the IMF or the CMIM but instead into a bilateral swap agreement with the Bank of Japan, Bank of China and the US Fed. Especially the latter was decisive in restoring the value of the Korean won (Kawai, 2015).

The Indonesian case is similar (even if the crisis was inferior in comparison to the Korean one), but it has an important difference. In this case the US Fed did not help the East Asian country. Instead, the Indonesian Republic asked for help from international economic institutions (ADB and World Bank), and some important countries like Australia, and especially Japan, that performed a decisive role in overcoming the Indonesian financial turmoil (Kawai, 2015).

These cases showed three aspects to the ASEAN Plus Three countries: first, the still strict dependence of the region on the US dollar and US Fed support; second, that this help is not something that can be taken for granted; third, the regional safety net system was insufficient and needed to be strengthened. Moreover, Mühlich and Fritz (2018) stress the asymmetries of power and the possible selection that the creditors (normally, the richest and powerful countries) could use against the smaller countries.

The tapering of the US Fed's Quantitative Easing in 2013 provoked capital outflows, the decline of the stock prices and currency depreciation in emergent countries like Indonesia and India. Kawai (2015) suggests that a faster raising of interest rates by the Fed could cause relevant liquidity shortage issues.

The recent crisis of 2008, the temporary crisis in South Korea and Indonesia, and the tapering of the Federal reserve in 2013 showed the limits of the present framework and increased the request for more changes and reforms to the AMRO-CMIM system.

Appendix 5 - Other Regional Financial Safety Nets in the world

In recent decades, other regions of the world decided to implement new regional safety nets. Some regions due to the particularities of their zone, some in response to the crisis, some others also have an alternative to the IMF. Hill and Menon (2014), Rana (2017), Fritz and Mühlich (2019), and McKay et al. (2011) illustrate different regional safety nets created in recent decades or those that increased their importance recently.

The Arab Monetary Fund (AMF) was launched in 1976 and started its operations in 1977. It includes 22 countries between North Africa and the Middle East. The Fund has a mix of six lending facilities and it is involved in short-term liquidity problems and more structural issues. In its history it has provided 146 loans to benefit 14 countries (Rana, 2017). The executive board is composed of nine members elected by the Board of Governors (of central banks). For

a quorum a two-thirds majority is required and even if some of the countries are really wealthy in comparison with others, the AMF is considered quite impartial in its decisions due to the particular composition and interests of the member states (McKay et al., 2011). In 2010 the Fund increased its total amount (548 million US dollars) of lending (Hill and Menon, 2014). Access to ordinary loan facilities is connected with an IMF programme but, generally, the AMF lending decisions are not conditioned by the IMF. The main organisms of the AMF are the Board of Governors and the Board of Executive Directors. Each member country has a fixed amount of 75 votes plus one vote for each share held. The decisions are taken by absolute majority (Fritz and Mühlich, 2019). The executive board is composed of eight seats and three are held by the largest member countries: Saudi Arabia, Algeria and Iraq. These three members hold about one third of the total votes (Fritz and Mühlich, 2019; McKay et al., 2011).

The Latin American Reserve Fund (Fondo Latinoamericano de Reservas, FLAR) replaced in 1991 the previous Andean Reserve Fund. It concerns seven Latin American countries. Like the CMIM, its principal functions are lending and surveillance. It has five kinds of lending instruments (Hill and Menon, 2014). Each country has one vote and it is not related to their contribution (Krings and Grimes, 2019) to the fund, and decisions are taken mostly on the basis of a three-fourths majority. The principal committees are the Assembly of Representatives and the Directorate. The former is composed of the Finance ministers of the member states. The latter instead is formed by the Central Bank Governors of the member states and it is headed by the Executive President. There are no links to the IMF but an exchange of information. The Fund was important especially for smaller country members in the 80s (Hill and Menon, 2014; McKay et al. 2011). Recently, however, the fund has been used less often (McKay et al. 2011). The current total amount is around 2.3 billion US dollars.

The North American Framework Agreement launched in 1994 among USA, Canada and Mexico provides short-term liquidity support and it is founded only on bilateral agreements between two member countries. Only the US Treasury required a letter from the IMF managing director. In 1994 the amount was of **2 billion for the Bank of Canada and 3 billion for the Bank of Mexico for the purpose of promoting orderly currency exchange markets.** **Currently,** the amount is still very small taking into account the economic dimensions of the countries involved (9 billion US dollars¹⁸).

The Eurasian Fund for Stabilisation and Development (EFSD) was created in 2009 and derives from the previous EURASEC Anti-crisis Fund. It is composed by Russia, Armenia, Tajikistan, Belarus, Kazakhstan and Kyrgyzstan. The total amount of funding is around 8.5 billion dollars. Similar to other funds, this global financial safety net was restructured and renovated during the Great Recession. According to Fritz and Mühlich (2019), the delivery of the fund's loans is very slow (from 4 weeks to more than a year). The EFSD provides only one line of credit for emergencies conditioned to a reform programme. The EFSD Council is the most important decision-making body for the fund. It consists of the Ministers of Finance of the member states. It is assisted by the Expert Council for expertise and by the EFSD Project Unit, which prepares and implements projects and acts as the fund secretariat.¹⁹ The decisions in the EFSD voting system are taken by simple majority and the different contributions of the member states are considered.

¹⁸ https://www.federalreserve.gov/monetarypolicy/bst_liquidityswaps.htm

¹⁹ <https://efsd.eabr.org/en/>

KOKKUVÕTE

Finantsturvavõrgud Kagu-Aasias ja Euroopas: poliitökonoomiline hinnang

Käesoleva artikli eesmärgiks on mõõta ja võrrelda liikmesriikide hääletusjõudu kahe finantsturvavõrgu puhul: Euroopa stabiilsusmehhanismi (ESM) ja süsteemi, mille moodustavad Chiang Mai mitmepoolsed algatused (CMIM) ja ASEAN+3 makromajanduslik uurimisbüroo (AMRO). Lisaks vaadeldakse uuringus CMIMi muutusi enne ja pärast selle ressursside suurenemist 2012. aastal.

Regionaalseid finantsturvavõrke võrdlevas kirjanduses puudub senimaani asjakohane hinnang poliitökonoomia vaatepunktist. Käesolev töö täidab kirjanduses oleva lõnga, uurides kahte kõige olulisemat ja uuemat regionaalset finantsturvalisuse võrgustikku. Artiklis viiakse läbi empiiriline analüüs, kasutades kaht tüüpilist hääletussüsteemide mõõtmise ühikut nagu Shapley-Shubiku ja Banzhafi indeksid.

Artiklist selgub, et vastupidiselt senistele oletustele kirjanduses on ASEANi väikseid riike pärast 2012. aasta muudatusi karistatud. Ainult lihtsaid hääletamiskaale jälgides pole need mõjud nähtavad. Shapley-Shubiku ja Banzhafi indeksite mõõtmise tulemuste põhjal väidame siiski, et suurte riikide, näiteks Jaapani ja Hiina, hääletusjõud on 2012. aastal pärast süsteemi muudatusi suurenenud.

Vastupidiselt ASEANi näitele, selgub ESMi põhistest tulemustest, et Banzhafi indeksi ja Shapley-Shubiki indeksi alusel pole liikmesriikide hääletusjõus olulisi erinevusi. Artikli empiiriliste tulemuste põhjal soovivad autorid, et AMRO-CMIM peaks arvestama ESMi kogemustega hääletamismehhanismi osas.