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Values-Based and Global Systemically Important Banks: Their Stability and the Impact of Regulatory Changes After the Financial Crisis on it

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Abstract
We study the financial stability of Values-Based Banks (VBBs) and Global Systemically Important Banks (GSIBs), and how regulatory changes in the aftermath of the financial crisis affected bank stability. These two types of banks allow contrasting an environmental and social impact banking approach to a conventional one. VBBs exhibit significantly higher financial stability before and during the financial crisis. However, regulatory changes in the aftermath of the financial crisis requiring higher capital buffer, have significantly affected GSIBs and rendered the difference in stability levels insignificant.

Keywords Bank stability · Values-based banks · Impact banking · Banking regulation

JEL Classifications G21 · Q01

1 Introduction

The outbreak of the financial crisis in 2007 and the following years of the economic downturn have shattered the trust of the public in the conventional global financial system. One essential debate exists on the question of how stable different types of financial institutions operate, and to what extent they are prepared for such challenging times (see, e.g., Beck et al., 2013). The current COVID19 pandemic and its unpredictable economic consequences give new momentum to this debate. As

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regulatory standards are a crucial pillar for the stability of the financial system and banks, in particular, the financial sector regulation has observed substantial changes after the financial crisis (FSB, 2011). In our particular setting, we examine the influence of these regulatory changes on the stability of two distinct types of banks: Values-Based Banks (VBBs) and Globally Systemically Important Banks (GSIBs). While the management of VBBs has a clear focus on providing banking solutions to serve the real economy and consider environmental, social, and economic aspects in the decision making, the management attention in GSIBs is primarily focused on return on equity and comparable measures. Thus, the latter banks consider regulatory standards as externally-imposed restrictions, and research attempts to understand whether bank regulation changes are for better or worse (Barth et al., 2008; Tanta, 2015). Our findings suggest that VBBs were more resilient before the financial crisis in 2007 than GSIBs. However, the regulatory changes imposed on the banking sector after the financial crisis have increased the stability of GSIBs significantly compared to the VBBs, which appear to have maintained their high levels of stability.

Academic literature has focused on identifying the causes of the crisis (e.g., BIS, 2018; Colander et al., 2009), the financial (e.g., Reinhart & Rogoff, 2009), social (e.g., Saunders & Wong, 2011), and political consequences thereof (e.g., Grant & Wilson, 2012), and its predictability to prevent similar events in the future (e.g., Betz et al., 2014; Jin et al., 2011). Among the main reasons for the financial crisis starting in 2007 was the fostering of a bubble inside the derivatives market that was associated with the detachment of the financial sector from the real economy (Benedikter, 2011; Colander et al., 2009). Therefore, a consequence of the financial crisis in 2007 was the continuation of adjusting regulatory requirements for the financial sector, essential in Europe since the large banks exhibit total assets higher than 250% of the GDP in Europe (Kalhoefer & Lang, 2019).

A global organization of banks launched in 2009 as a commitment to integrate social, environmental, and economic issues into banking models in contrast to the detachment of the financial sector from the real economy, is the Global Alliance for Banking on Values (GABV). The GABV is one of the most prominent organizations that support environmental and social impact banking as an alternative to conventional banking practices. Related research argues in favor of an integrated view of economic value creation while operating within a social and environmental framework, and allocating resources to urgent societal needs (Becchetti, 2011; Benedikter, 2011). The focus on sustainable financing solution of member institutions of GABV raises the question of whether this type of bank is more stable than conventional banks. Analyzing this research question adds to the findings of Breitenstein et al. (2020) that conclude that financial institutions can reduce their risk exposure by highly committing to environmental responsibility and performance. In this context, several other academic papers in the area of sustainable finance show that the consideration of environmental and social aspects in business activities reduces firm risk (e.g., Bouslah et al., 2013; Cai et al., 2016; Cui et al., 2018; Dorfleitner et al., 2020; Fauser & Utz, 2020; Godfrey, 2005; Godfrey et al., 2009; Gougler & Utz, 2020; Harjoto & Laksmana, 2018; Koh et al., 2014; Lins et al., 2017; McWilliams et al., 2006).

In a first step, we add to studies on the stability of VBBs (Karl, 2015; Mykhayliv & Zauner, 2018) and focus on this topic by investigating whether VBBs exhibit higher levels of stability than GSIBs. We analyze VBBs and GSIBs across different indicators of financial stability derived from adjacent fields of literature, such as the drivers of general bank stability (e.g., Fratzscher et al., 2016; Köhler, 2012) and the impact of corporate social responsibility (CSR) on the financial stability of banks (e.g., Margolis et al., 2007; Wu & Shen, 2013).

Our empirical study employs a unique, proprietary panel data set from 2001 to 2018, consisting of 41 GABV member institutions and 29 GSIBs as defined by the Financial Stability Board (FSB). Thus, it spans a period before, during, and after the global financial crisis. This setting allows us to track the regulatory-imposed changes in the banking sector for additional capital requirements for GSIBs by the FSB (2011) after the financial crisis. We refer to this impact of the regulatory changes on the stability of the different types of banks as the second step in our analysis and the main hypothesis. In particular, we apply the z-score, the most commonly used measure of bank stability (e.g., Ahamed & Mallick, 2019; Čihák & Hesse, 2007; Karl, 2015), and the modified z-score with a focus on downward volatility as stability measures. Both stability measures reflect a bank's default probability and, hence, proxy the overall insolvency risk. To estimate the different developments of the stability measures for VBBs and GSIBs after significant regulatory changes, we conduct a difference-in-differences analysis.

Our key results are twofold: Firstly, we show that VBBs were significantly more stable than GSIBs in general. This relation, however, diminished after the financial crisis. The relationship is likely to be driven by regulations imposing an improved capital structure of GSIBs. The new regulatory requirements have led to particularly GSIBs increasing their stability after the financial crisis (BIS, 2018; Shaddady & Moore, 2019; Tabak et al., 2013). Secondly, VBBs of developed countries show significantly higher stability levels than VBBs from emerging countries throughout the entire period. Moreover, VBBs from developed countries show even stronger stability levels compared to GSIBs, which also operate and are located in developed countries.[1]

To our knowledge, this is the first study analyzing the relationship of differences in the stability of VBBs and GSIBs with regulatory changes after the financial crisis 2007–2009. This research on a unique set of VBBs and the world's largest banks is relevant in the light of the combination of economic stability and the contribution to environmental and social challenges of financial institutions. Hence, the contribution of our paper to the literature is twofold. Firstly, it complements the research on general determinants of bank stability, which is currently focused on capital structure (e.g., Berger & Bouwman, 2013), income (e.g., Altunbas et al., 2017), and regulation (e.g., BIS, 2018) by showing that the values-based business model for banks may improve stability. Secondly, it augments existing literature on values-based banking, which to this day, predominantly covers business models, company

[1] Note that most GSIBs have global business models so tying them to one country is not valid. They are dependent on the global developed markets for their activities.

missions (e.g., Climent, 2018; Weber, 2017) and performance measurement (e.g., Weber, 2011), by analyzing the stability associated with it.

Two related studies consider the performance and risk of alternative banks. Mykhayliv and Zauner (2018) analyze the financial stability of banks as a byproduct of their main study while focusing on other aspects of alternative banking. Besides, to the best of our knowledge, currently, only one paper with a clear focus on the comparison of stability levels between alternative and conventional banks exists (Karl, 2015). Our study contributes to these studies in four ways. Firstly, we use a more comprehensive approach to measuring bank stability, analyzing stability measures indicators. Secondly, we examine whether GSIBs developed to adapt stability indicators similar to those of VBBs after the financial crisis imposed by regulatory changes. Thirdly, while Karl (2015) analyzes a data set comprising banks being classified as "values-based" according to different (heterogeneous) definitions, our study follows a much stricter definition of values-based banking. The inclusion of only members of the GABV with its clear rules eliminates the risk of covering banks that only pretend to be value-oriented as a marketing argument. Fourthly, in contrast to the control group of conventional banks, which Karl (2015) identifies to be similar in origin, size, and bank type, we follow Mykhayliv and Zauner (2018) and the GABV (2019b) in comparing VBBs and GSIBs. GSIBs are a group of banks that is more suitable in our setting, as additional regulatory requirements have been put in place to enhance their stability (FSB, 2011). Thus, our research design is an appropriate setting to investigate whether environmental and social impact banking has been run at self-regulation standards that could be integrated into effective regulation to stabilize the GSIBs.

The remainder of this paper is structured as follows: Sect. 2 provides background on values-based banking and bank stability, forming the basis for hypothesis development. Sections 3 and 4 describe the data and the methodology used to analyze the stability of VBBs and GSIBs. Section 5 provides the empirical results of the study and a discussion thereof, while Section 6 concludes.

2 Background and Hypothesis Development

2.1 Values-Based Banking

Currently, literature does not provide a clear definition of values-based banking. Many researchers offer overviews of different definitions and approaches (e.g., Weber & Remer, 2011), historical developments (e.g., Milano, 2011), and outlooks on future advancements (e.g., Carè, 2018; Weber & Remer, 2011). We follow De Clerck (2009) and define values-based banking as an umbrella term encompassing alternative, ethical, social, sustainable, solidarity, poverty alleviation, and development banking, offering products and services (i.e., loans, savings accounts, and investments) which are based on deliberations of non-financial nature. Moreover, these actions create a positive impact on the environment, people, culture, and society at large (De Clerck, 2009; Weber & Duan, 2012; Weber & Remer, 2011).

With their roots in Italy of the middle ages (Milano, 2011), VBBs have been shown to follow a variety of different missions and business models (e.g., Weber, 2017). This heterogeneity is also reflected in VBBs financing structure and revenue streams (Becchetti, 2011). All VBBs, however, follow the main principles of transparency, communication, and participation across all operations, while seeking the maximum output on all aspects of the triple bottom line (Climent, 2018; von Passavant, 2011).

In contrast to conventional banks, VBBs seek profits through investing in ethical projects with a social or ecological impact, channeling funds to high-impact industries, which promote equality, employability, environmental sustainability, cooperation, commitment, and reinvestment (Climent, 2018). In terms of revenue streams and the products offered to clients, VBBs focus on the traditional community banking and refrain from speculating activities (Mykhayliv & Zauner, 2018), a focus emphasizing their devotion to the support of the real economy (GABV, 2019b).

Many researchers attribute the outbreak of the 2007 financial crisis to the detachment of the financial system from general ethical behavior, humane values, and the real economy (Benedikter, 2011; Carè, 2018; Colander et al., 2009). Consequently, the most recent increase in attention for VBBs from academia, media, and investors is driven by environmental conscience and by a search for trust, as the financial crisis has led to a lack of confidence in traditional financial market players (Biehl et al., 2012; Climent, 2018).

In the aftermath of the financial crisis, legislators have passed several regulations to prevent a recurrence of such events, aiming at more robust stability within global economic systems (BIS, 2018; Laeven & Levine, 2009). It remains mostly unknown, however, that during the period from 2007 to 2009, while renowned conventional banks were threatened by a bankruptcy (Lee & Rose, 2010), impact banks made the most significant average gains in their history with net profit growth rates of up to 86.5% (Weber, 2011). Benedikter (2011) explains this difference in development by arguing that (1) social irresponsibility, (2) in-transparency, and (3) unsustainability of conventional banks led to the outbreak of the financial crisis. In particular, VBBs actively counteract these three factors with responsibility and transparency being at the core of the principles of values-based banking (GABV, 2019b). Hence, these developments suggest that VBBs are more resilient during crisis periods than their conventional counterparts, an insight that has been supported by academic research (e.g., Karl, 2015).

2.2 Bank Stability and its Measurement

We identify two main streams of literature on bank stability: firstly, the analysis of drivers of stability (e.g., Beltratti & Stulz, 2012; Köhler, 2012) and the differences in stability between distinct types of banks (e.g., Čihák & Hesse, 2007; Hassan et al., 2019); and secondly, the impact of (in)stability and risk on the industry (e.g., Shleifer & Vishny, 2010) and economy at large (e.g., Agnello & Sousa, 2012). Our study focuses on the former stream by analyzing the impact of the values-based business model on individual institutions' stability.

The study considers general stability measures to analyze stability. Since studies on the financial stability of VBBs are scarce, we consider two different strands of literature, both of which allow for derivations regarding the stability of VBBs: (1) general drivers of bank stability to deduce conclusions about the subset of VBBs and (2) the impact of a values-based business model on the financial stability across different industries. While the former does not allow for definite conclusions regarding the stability of VBBs versus GSIBs, the latter allows for the hypothesis that VBBs exhibit higher levels of stability.

2.3 Sustainability and Firm Stability

Next to general stability indicators, the impact of a sustainable business approach as a stability and performance driver has been widely studied, but findings are inconclusive (e.g., Preston & O'Bannon, 1997). A meta-study by Margolis et al. (2007) across different industries shows the relationship between CSR and financial performance to be positive generally, yet not very strong. This finding is supported by banking-specific studies (e.g., Baker et al., 2019; Simpson & Kohers, 2002).

While a few non-sector specific studies on the relationship of CSR and instability in terms of risk or credit ratings exist (e.g., Dorfleitner et al., 2020; Kim et al., 2014; Lee & Faff, 2009), studies focusing on CSR and bank stability are scarce (e.g., Cooper et al., 2019). The majority of non-sector specific studies support the risk mitigation theory, claiming that higher environmental, social, and governance (ESG) records are associated with lower levels of idiosyncratic and crash risk (Goss & Roberts, 2011; Utz, 2018).

However, less similar evidence exists for banks. Financial firms exhibit a positive relation between CSR and performance (Baker et al., 2019; Wu & Shen, 2013), and their return on equity is significantly more abundant for top CSR institutions compared to the bottom ones. Moreover, CSR performance is positively related to stability levels in terms of capital ratios and return on assets (Cooper et al., 2019). Furthermore, evidence from Chinese banks during the financial crisis suggests that governmental stimuli to increase CSR have resulted in capital being tied up in responsibility projects, diverting money from more profitable, yet riskier banking activities. During the crisis, this diversion led to an avoidance of heavy losses on high-risk activities. Heavy losses would have created chain-effects that ultimately have threatened the stability of individual banks and even the financial system (Liu, 2012). 2.4. Hypothesis development: stability of VBBs.

As only minimal direct evidence on the relationship between values-based banking and stability exists (Karl, 2015; Mykhayliv & Zauner, 2018), the hypothesis development requires careful consideration of the two strains of the theory presented. Based on the findings of the general drivers of stability, no unequivocal hypothesis regarding the stability of VBBs compared to GSIBs can be derived.

The unobstructed view of researchers that CSR is positively associated with stability both outside and inside the financial sector (e.g., Lee & Faff, 2009; Utz, 2018; Wu & Shen, 2013) allows for the conclusion that this relationship may also hold between VBBs and GSIBs. In particular, business models and bank-specific

choices, such as funding (e.g., Beltratti & Stulz, 2012), capital structure (e.g., Berger & Bouwman, 2013), and revenue streams (e.g., Altunbas et al., 2017) may impact the predictions of research as to how stable the respective bank is. Hence, we assume that the firms, VBBs collaborate with, show better CSR and ESG rankings than the firms that collaborate with conventional financial institutions. In this particular focus on generating sustainable impact by a loan, VBBs differentiate from traditional credit unions and small- or medium-sized banks. If the particular business model of VBBs generates stability aspects above the classical loans and deposits approach by credit unions and small- and medium-sized banks, the results also hold after controlling for the loans to deposits ratio. Therefore, we expect their business model to have a significantly positive impact on the stability of VBBs relative to GSIBs.

Hypothesis 1: VBBs are more stable than GSIBs.

Moreover, significant regulatory changes in the financial sector have been implemented after the financial crisis. Even before the collapse of Lehman Brothers in September 2008, a fundamental strengthening of the Basel II framework has been claimed. High leverage and inadequate liquidity buffers in the banking sector at the beginning of the financial crisis were accompanied by poor governance and risk management, as well as inappropriate incentive structures. The dangerous combination of these factors was demonstrated by the mispricing of credit and liquidity risks and excess credit growth.

Responding to these risk factors, the Basel Committee issued principles for sound liquidity risk management and supervision in the same month that Lehman Brothers failed. In July 2009, the Committee issued a further package of documents to strengthen the Basel II capital framework, notably concerning the treatment of specific complex securitization positions, off-balance-sheet vehicles, and trading book exposures. These enhancements were part of a broader effort to strengthen the regulation and supervision of internationally active banks, in the light of weaknesses revealed by the financial market crisis.

In September 2010, the Group of Governors and Heads of Supervision announced higher global minimum capital standards for commercial banks. This followed an agreement reached in July regarding the overall design of the capital and liquidity reform package, now referred to as "Basel III". In November 2010, the new capital and liquidity standards were endorsed by the G20 members and subsequently agreed at the December 2010 Basel Committee meeting. The enhanced Basel framework revises and strengthens the three pillars established by Basel II, and extends it in several areas. Most of the reforms are being phased in between 2013 and 2019. From 2011, the Committee turned its attention to improvements in the calculation of capital requirements.

One significant aspect is the Capital Requirement Directive III (CRD III) that was adopted in November 2010 and had to be performed by January 2011. This regulation requires GSIBs “to have additional loss absorption capacity tailored to the impact of their default, rising from 1 to 2.5% of risk-weighted assets […] to

be met with common equity" (FSB, 2011). Although the CRD IV (follow-up of CRD III) became effective not until July 2013, banks have already started to shift their balance sheets accordingly. Therefore, we expect an alignment of the stability indicators of GSIBs to those of VBBs. Hypothesis 2, thus, reads as follows:

Hypothesis 2: Regulatory changes after the financial crisis reduced the differences in stability levels between VBBs and GSIBs.

3 Dependent Variable Measuring Bank Stability

3.1 Stability Variables

We identify seven critical drivers for bank stability along with the areas of bank characteristics and geography-dependent macroeconomic drivers from the existent literature: financial performance (Beck et al., 2013; Betz et al., 2014; Cecchetti, 2008; Cole & White, 2012), capital structure (Altunbas et al., 2017; Beltratti & Stulz, 2012; Berger & Bouwman, 2013; Betz et al., 2014; Shleifer & Vishny, 2010), asset structure (Altunbas et al. 2017; Demirgüç-Kunt & Huizinga, 2010; Köhler, 2012; Schaek & Čihák, 2014), loan growth (Altunbas et al., 2017; Foos et al., 2010; Jin et al., 2011; Köhler, 2012), liabilities structure (Altunbas et al., 2017; Beltratti & Stulz, 2012; Cecchetti, 2008; Demirgüç-Kunt & Huizinga, 2010; Laeven et al., 2016), size (Cole & White, 2012; Laeven et al., 2016; Schaek & Čihák, 2014; Shleifer & Vishny, 2010; Tabak et al., 2013), and geographic variables such as lower competition (e.g., Schaek & Čihák, 2014), beneficial regulation (e.g., Fratzscher et al., 2016; Laeven & Levine, 2009), and higher lending standards (e.g., Köhler, 2012). While this list is not exhaustive, it includes the most relevant variables defined in the literature.

To capture the mentioned drivers for stability, we consider two aggregated outcome variables for bank stability: the z-score and the modified z-score. The z-score (introduced by Boyd et al., 1993) is the most common stability measure and has been used in numerous studies related to bank risk (e.g., Laeven & Levine, 2009). The z-score measures the number of standard deviations a return realization has to fall to deplete equity, under the assumption of normality of banks' returns (see Čihák & Hesse, 2007). It is, thus, a measure for a bank's distance to insolvency with insolvency being defined as losses surmounting the bank's equity (Laeven & Levine, 2009). Consequently, a higher z-score means a higher level of stability. Recent research has shown that the z-score is at least as robust in predicting bank distress as more conventional measures, and is particularly popular due to its simple calculation (Chiaramonte et al., 2015, p. 111). The z-score is calculated as follows:

$$z\text{-}score = \frac{\frac{Equity}{Total\ assets} + ROA}{Std.\,Dev.\,of\ ROA}$$

To account for seasonality effects, we follow Cooper et al. (2019) and Terraza (2015) and use the return on total assets (ROA) where total assets are the average of

the total assets of the beginning and the end of the year. The sample standard deviation of the z-score is based on all ROAs available for the respective bank. It includes at least ten years of ROAs for each bank.[2] Since both a higher equity ratio and increased performance serve as capital buffers in times of crisis, they also increase the z-score, while the volatility of ROA reduces stability. Similarly, Beltratti and Stulz (2012) show the stability (as proxied by the z-score) to be significantly lower during the financial crisis for the top-performing quartile in terms of stock price returns compared to the bottom one.

The second measure is the modified z-score. It accounts for downward spikes of the ROA since they are relevant for the probability of distress. We follow Čihák and Hesse (2007) and Karl (2015) in introducing a modified z-score, only taking into account the downward volatility of the ROA.

$$Modified\ z\text{-}score = \frac{\frac{Equity}{Total\ assets} + ROA}{Downward\ volatility\ of\ ROA}$$

The risk of insolvency in the case that capital does not cover incurred losses, is equally eminent for VBBs and GSIBs. Hence, despite their different banking approaches, the regular and the modified z-scores are adequate and objective stability measures for proxies of the risk of insolvency in our study.

4 Data

We consider two samples of banks: Values-Based Banks, defined as the members of the Global Alliance for Banking on Values, and Global Systemically Important Banks as defined by the Financial Stability Board. The observation period ranges from 2001 to 2018. It will, henceforth, and following current literature, be split into three sub-periods: (1) the pre-crisis period encompassing the years 2001 to 2006, (2) the crisis period ranging from 2007 to 2009, and (3) the post-crisis period from 2010 to 2018 (Beck et al., 2013; Mykhayliv & Zauner, 2018).

4.1 VBBs and the GABV

To ensure the highest possible values-based standards, the sample for the VBBs analyzed in this study consists of 41 current members of the GABV for which sufficient

[2] As this definition is somewhat arbitrary, however, we perform the same analysis for a z-score with seven-year, five-year, and three-year rolling standard deviations, yielding similar results. We follow extant literature in introducing alternative z-scores to assess the results' sensitivity to the stability measure used (Čihák & Hesse, 2007; Karl, 2015) and use three different standard deviations of the ROA in the denominator of the z-score to standardize the periods covered: seven-year, five-year, and three-year rolling. The conclusions which can be derived broadly reflect the ones developed in the regular z-score analysis.

firm-specific stability data were available. This alliance is an independent network of banks that was founded in 2009[3] as an answer to an erosion of trust in conventional financial institutions in the early 2000s with its peak during the financial crisis. It follows the goal to change the banking system so that it is more transparent, supports economic, social and environmental sustainability, and is composed of a diverse range of banking institutions serving the real economy (GABV, 2019a). Table 8 lists the GABV member institutions.

In July of 2019, the GABV encompassed a total of 56 banks, credit unions, banking cooperatives, community and development banks, and microfinance institutions on all continents. Despite their differences in mission, funding, and organizational structure, they all aim at creating value for the real economy rather than for the financial one by returning to the original banking business focusing on community banking (i.e., mainly loans and deposits) and not mere profit maximization (Remer, 2014; Scheire & de Maertelaere, 2009; Weber, 2011; Weber & Duan, 2012). Additionally, all members of the GABV need to adhere to the basic principles of values-based banking, including transparency of governance, long-term relationships, and self-sustainability (GABV, 2019b). Table 9 contains a detailed description of the principles of values-based banking.

Despite a few studies broadening their definition of VBBs beyond the GABV (e.g., Janik, 2017; Karl, 2015; Mykhayliv & Zauner, 2018), we follow Scheire and de Maertelaere (2009) in employing a more conservative definition to include members of the GABV in the VBB sample exclusively. This approach helps to prevent the inclusion of banks merely greenwashing their image, as the GABV's screening process for VBBs is used as an additional filter. Thus, the sample only entails the most sustainable and impact banks.

4.2 GSIBs

GSIBs, our second group of banks, follow the definition of the Financial Stability Board (FSB, 2018). They encompass 29 banks which represent about one-third of total global banking assets and surpass certain thresholds for inclusion criteria in different categories such as size, cross-jurisdictional activity, interconnectedness, substitutability, financial institution infrastructure, and complexity as defined by the Bank of International Settlements (BIS, 2017, 2018). Table 10 lists the GSIBs.

GSIBs were chosen as a group of banks that is exposed to changes in international regulatory standards. Moreover, GSIBs, compared with other conventional banks, exhibit comparably high levels of stability, which are driven by high requirements for capital buffers, liquidity, loss-absorbing capacity, resolvability, and supervisory expectations. These requirements are in place due to the banks being identified as systemically important (BIS, 2017; FSB, 2018). Moreover, GSIBs are less likely to adopt the principles of values-based banking and expand their product

[3] We assume that the members of the GABV were already acting as values-based banks before the launch of the GABV in 2009, and thus consider the GABV members to be VBBs also before 2009. We checked this assumption by reviewing the strategic positioning of the banks.

portfolio by offering values-based products (Remer, 2014) than non-GSIB banks as used, for example, by Karl (2015). This practice would blur the boundaries to VBBs.

4.3 Data Collection and Processing

We utilize a unique panel data set of VBBs of annual financial statements data reported through a data template that we circulated among GABV member institutions. Data for GSIBs is publicly available and was retrieved from Refinitiv Eikon. For both sample groups, we retrieved the same variables, which were selected along with the definitions of our two stability measures and additional ratios used for descriptive statistics and bank-specific control variables. Table 11 contains a list of all variables and ratios we use in this paper.

Ultimately, the data template for VBBs included variables about general information of the yearly balance sheets and income statements for 2001–2018. To ensure comparability, we additionally supplied definitions for each item retrieved from Eikon to the VBBs alongside the questionnaire. The GABV circulated the data template to 50 out of their 56 members for completion. Out of these 50 banks, 20 banks returned the completed data template. Additional to these 20 banks, we included further 21 VBBs in the analysis for which we could reconstruct stability measures for at least ten consecutive years using the information they had already reported to the GABV on an annual basis. For consistency checks, we compared the self-reported data of a bank with publicly available data for it.

We retrieved all yearly data for the GSIBs from Eikon. For the sake of computational consistency, we constructed ratios from financial statement items for GSIBs instead of directly obtaining the ratios from Eikon. We included the version of these ratios directly retrieved from Eikon in the collection process but merely used them as a further robustness check for the calculations. We corrected outliers for one VBB stemmed from faulty data provision by substituting the provided values by those available in the annual report. While we retrieved all data for GSIBs in USD, we use the end of year exchange rates for the standardization of the size of all banks not reporting in USD.

Moreover, we excluded distortions from distinct bank-specific one-off events, like the foundation or the receipt of a banking license from the data set. As six VBBs were founded between 2001 and 2007, we eliminated all data for the founding and the subsequent year from the panel. Furthermore, we retrieved most macroeconomic data from Eikon while we filled in missing data using Trading Economics due to the high level of completeness of the database.

4.4 Descriptive Statistics

The overall sample comprises an unbalanced panel of a total of 70 banks (41 VBBs and 29 GSIBs) and up to 1123 firm-year observations. VBBs are from 29 different countries and GSIBs from 12 different countries. Table 1 gives an overview of the two samples for the overall period, including their average balance sheet sizes (in USDm), asset growth rates, and indicators for capitalization (leverage ratio) and

Table 1 Descriptive statistics (overall period)

	Total assets (in USDm)		Asset growth		Leverage ratio		Return on assets (ROA)	
	GSIBs	VBBs	GSIBs	VBBs	GSIBs	VBBs	GSIBs	VBBs
Mean	1,396,575	1,765	8.63%	15.88%	94.25%	90.08%	0.60%	1.10%
Std. Dev	581,500	3,205	4.26%	11.34%	2.24%	3.93%	0.37%	1.23%
10th	603,188	92	3.23%	4.61%	90.85%	84.76%	0.18%	0.12%
90th	2,066,660	4,211	14.52%	35.91%	96.49%	94.64%	1.03%	2.13%
t-value	(12.92)		(−3.74)		(5.63)		(−2.47)	
N	499	623	470	582	499	624	499	623
Banks	29	41	29	41	29	41	29	41

The table shows the descriptive statistics. It reports the average (*mean*), standard deviation (*Std. Dev.*), 10th percentile (*10th*), 90th percentile (*90th*), number of firm-year observations (*N*), and number of banks included (*Banks*). The t-values state the significance of the difference in means between GSIBs and VBBs. The mean is calculated as the mean of all banks' ways to avoid overweight. The Shapiro-Wilk test yielded non-normality. However, t-values are used as the Wilcox test yields the same results in terms of significance

performance (return on assets). Additionally, the value for the t-test comparing the means for both types of banks are depicted for each variable.

The statistics show that VBBs and GSIBs differ significantly (at a 1% significance level) to all four variables. An average GSIB is about 800 times the size of a VBB. Moreover, the heterogeneity among VBBs in terms of size is high, since total assets show a high standard deviation (relative to the mean). This heterogeneity can be attributed to the distinct business models and geographic reach (Becchetti, 2011) and stands in contrast to GSIBs, which show a much higher level of homogeneity.

The average asset growth rates and ROA are significantly higher for VBBs, and they show substantially better capitalization rates throughout the entire observation period. Every year (unreported results), the ROA has always been higher for VBBs, but its significance level has varied over time. This pattern is consistent with the findings by Weber (2011), who argues that VBBs showed their highest growth rates during the financial crisis, spurred by the lack of trust in conventional institutions (BIS, 2018).

Considering the three distinct periods (pre-crisis, crisis, and post-crisis) in our observation period, there are first indications that stability measures of VBBs and GSIBs converge after the financial crisis (see Table 2, Panel A). The differences between the z-score and the modified z-score of VBBs and GSIBs are significantly different before the financial crisis. Yet, the difference turns insignificant in the post-crisis period. The overall positive development, however, appears to be driven by a substantial increase in average equity ratios of GSIBs (see Table 2, Panel B), which may stem from the introduction of additional capital requirements introduced for GSIBs in 2011.

Concerning the capital adequacy, the equity ratio is significantly higher for VBBs throughout the entire period of the study but increases for GSIBs, particularly after the financial crisis. Nevertheless, VBBs seem to absorb losses better by using their

Table 2 Stability measures by period and bank type

	Pre-crisis period			Crisis period			Post-crisis period		
	GSIB	VBB	t-value	GSIB	VBB	t-value	GSIB	VBB	t-value
Panel A: stability measures									
z-score	20.31	31.23	(−1.78)	21.62	29.23	(−1.22)	29.09	29.69	(−0.10)
Modified z-score	23.58	46.57	(−2.44)	24.95	42.86	(−1.92)	33.90	42.90	(−1.03)
Panel B: additional indicators									
ROA	0.71%	1.97%	(−3.35)	0.45%	0.95%	(−2.12)	0.56%	1.00%	(−2.10)
Equity ratio	4.72%	11.2%	(−5.27)	4.98%	9.71%	(−5.33)	6.63%	9.67%	(−4.14)
ROE	12.9%	14.6%	(−0.49)	6.83%	9.26%	(−1.00)	8.18%	8.89%	(−0.40)
NPL	2.84%	1.79%	(1.01)	2.49%	2.81%	(−0.32)	3.23%	2.86%	(0.48)
LTD	71.6%	96.0%	(−3.68)	70.6%	92.7%	(−3.44)	70.8%	94.3%	(−2.97)
STA	32.1%	10.4%	(6.99)	36.0%	8.50%	(8.00)	31.6%	12.5%	(6.75)

The table presents average values of the stability measures (z-score and modified z-score) and the control variables (return on assets (ROA), equity ratio, return on equity (ROE), non-performing loans ratio (NPL), loan-to-deposit ratio (LTD), and securities-to-assets ratio (STA)) for both types of banks over the pre-crisis, crisis, and post-crisis period. The numbers indicated are means. To avoid the overweighing of banks with high data availability, the means are calculated as the mean of all banks' means. The t-values (numbers in parentheses) show the significance of the difference in means between GSIBs and VBBs. The Shapiro-Wilk test yielded non-normality. However, t-values are used as the Wilcox test yields the same results in terms of significance

capital, which is essential to their stability (Betz et al., 2014; Cole & White, 2012). The reasons for these high capital levels of VBBs may be manifold. Firstly, their larger size allows GSIBs to engage in more off-balance sheet operations, e.g., in securitization, allowing for higher leverage, while generally small banks cannot obtain as much debt (Köhler, 2012; Shleifer & Vishny, 2010). Moreover, managers of GSIBs draw strategic decisions to keep capital ratios low to enhance ROE, driven by investor demands and executive compensation programs. Secondly, their low leverage, combined with a high loan-to-deposit ratio, reflects the VBBs' devotion to the real economy and independence from the interbank market (GABV, 2019b; Scheire & de Maertelaere, 2009). Additionally, Table 3 reports on summary statistics of the control variables in our later empirical analyses.

5 Empirical Analysis

5.1 Main Results

To test whether VBBs are more stable than GSIBs in general (Hypothesis 1), we run multivariate regression models with robust clustered standard errors on the bank level. The dependent variables in the model specifications are the stability measures (*SM*). We explain the variation in the dependent variables by a VBB dummy that equals one for VBBs and zero for GSIBs. Moreover, we control for bank characteristics, country specifics, and year fixed effects. Following Karl

Table 3 Descriptive statistics of the control variables of VBBs and GSIBs

	Mean	Std. Dev.	10th	90th
Loans-to-assets				
VBB	0.693	0.138	0.491	0.855
GSIB	0.398	0.147	0.172	0.563
Loan growth ratio				
VBB	0.161	0.215	−0.001	0.357
GSIB	0.080	0.172	−0.067	0.243
Deposits-to-liabilities ratio				
VBB	0.855	0.154	0.624	0.984
GSIB	0.610	0.184	0.376	0.913
Log(total assets)				
VBB	20.121	1.605	18.127	22.257
GSIB	27.718	0.790	26.605	28.545
Average GDP growth				
VBB	0.029	0.030	2e−03	0.067
GSIB	0.026	0.031	1e−04	0.073
Average GDP per capita				
VBB	31,051.37	24,534.35	798.8736	57,876.63
GSIB	39,091.74	17,798.32	7,701.6900	56,770.40
Government debt-to-GDP ratio				
VBB	0.658	0.404	0.253	1.048
GSIB	0.829	0.483	0.344	1.468
ROE				
VBB	0.092	0.163	0.007	0.248
GSIB	0.095	0.099	0.010	0.195

The table shows the descriptive statistics of the control variables in the multivariate regression analyses. It reports the average (*mean*), standard deviation (*Std. Dev.*), 10th percentile (*10th*), and 90th percentile (*90th*) for GSIBs and VBBs. The mean is calculated as the mean of all banks' ways to avoid overweight

(2015), we estimate a pooled OLS model as bank fixed effects cannot be estimated due to the allocation to a specific bank type (VBB or GSIB) being time-invariant. Hence, the regression is of the following form:

$$SM_{i,t} = \alpha + \beta_1 VBB_i + \beta_2 LTA_{i,t} + \beta_3 LG_{i,t} + \beta_4 DTL_{i,t} + \beta_5 \ln\left(size_{i,t}\right) + \beta_6 GDPcap_{c,t} + \beta_7 GDPgr_{c,t} + \beta_8 D/GDP_{c,t} + year_t + \varepsilon_{i,c,t}$$

where LTA, LG, DTL, and ln(size) refer to the bank-specific loans-to-asset ratio, loan growth, deposits-to-liabilities ratio, and natural logarithm of the total assets, respectively. Additionally, we include three commonly used country-level control variables: GDP per capita (GDPcap), GDP growth (GDPgr), and government debt-to-GDP ratio (D/GDP). $year_t$ represents the year fixed effects and $\varepsilon_{i,c,t}$ the residuals.

The rationale behind the control variables is the following: We control for different bank-specific and macroeconomic characteristics to capture the unadulterated impact that the values-based orientation has on the stability of banks. For bank-specific characteristics, we control for the bank's asset structure using the loans-to-assets ratio. This measure is also used by the GABV to capture a bank's impact on the real economy (GABV, 2019b). The loan growth ratio resembles the year-on-year growth of total gross loans. It is introduced due to the strong negative relationship found in the literature between loan growth and bank stability (e.g., Foos et al., 2010). With deposits being considered the more stable source of funding compared to wholesale funding (Altunbas et al., 2017), we introduce the deposits-to-liabilities ratio to control for differences in funding structure between the bank types. Moreover, due to the substantial difference in average size between the two sample groups showcasing the heterogeneity within the VBB sample, we lastly introduce a control variable for the bank's size measured as the natural logarithm of the bank's total assets in USD.

To account for the impact of the country and the general macroeconomic conditions on the stability of banks, we additionally consider three macroeconomic variables in the regression analysis. First, we use the average GDP per capita to control for the country's economic power, which we expect to be positively associated with generally higher levels of bank activity (Sethi & Acharya, 2018). Additionally, we expect that all banks were hit by the financial crisis, neither at the same time nor to the same extent (BIS, 2018). Therefore, following Karl (2015), we proxy the general country-specific macroeconomic conditions in the regression by using the average GDP growth. Thirdly, research has shown that the government debt-to-GDP ratio can be considered as a measure reflecting the macroeconomic conditions and negatively influences the banks' stability (Betz et al., 2014). We, thus, introduce the debt-to-GDP to control for the government's ability to bail out banks (Calderon & Schaeck, 2016).

Since the variance inflation factors (VIF) for the VBB dummy and the bank size are high indicating multicollinearity, we apply the following orthogonalization: In a first stage, we regress the VBB dummy on the bank size and store the residuals of this regression as the remaining variability in the VBB dummy after controlling for size. We use these residuals as the new VBB variable and run our models accordingly. The Pearson correlation between the initial VBB dummy and the residuals is 0.33. This indicates that the direction of the relationship holds, i.e., a positive coefficient on the regression model for the residuals variable, meaning a positive impact of the VBB dummy. The VIF in the models with the new VBB variable is below 3, indicating a proper regression model environment.

In the stability measures regressions, both coefficients of the VBB dummies are significantly positive (see Table 4, Columns "z-score" and "Modified z-score"). Thus, VBBs show higher stability than GSIBs. Therefore, this multivariate analysis elicits supporting evidence for Hypothesis 1 in terms of the stability measures. In summary, the banking model of VBBs appears to be more robust in terms of the analyzed stability measures compared with the GSIB banking model.

The orthogonalized VBB variable is a proxy for the VBBs' business model that is independent of the size of the bank. Since the correlation with the initial VBB

Table 4 Multivariate regression analysis of the stability of VBBs

	z-score	Modified z-score
VBB	30.27***	47.80***
	(8.19)	(11.12)
Loans-to-assets	−19.53***	−13.70
	(7.21)	(9.69)
Loan growth ratio	7.69	2.19
	(5.94)	(6.47)
Deposits-to-liabilities ratio	55.83***	60.35***
	(6.24)	(7.70)
Log(total assets)	1.10***	0.54
	(0.24)	(0.35)
Average GDP growth	−141.52***	−144.50***
	(41.13)	(50.91)
Average GDP per capita	4.69***	6.45***
	(0.84)	(1.33)
Government debt-to-GDP ratio	−19.78***	−29.01***
	(2.01)	(2.80)
Constant	−54.31***	−47.24**
	(26.02)	(17.80)
Year FE	yes	yes
Observations	893	893
Adjusted R^2	0.218	0.181
F-stat	11.39***	9.217***

The table presents results of the OLS regressions in which we explain the variation in stability measures (z-score and modified z-score) by the VBB dummy and further bank and country characteristics. Values in parentheses are bank-clustered robust standard errors. *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$

dummy is positive, a positive coefficient indicates that this type of a business model has a stability-increasing effect. This is particularly interesting when considering the coefficients of the first control variable loan-to-deposits ratio. Since we control for this variable, the coefficients of 30.27 and 47.80 of the VBB variable indicate that above the classical banking model they apply (loans are primarily backed by deposits) the way how VBBs operate makes them more stable.

5.2 The Time-Dependent Stability Difference Between VBBs and GSIBs

We continue to investigate whether the stability of VBBs shows a time-dependent pattern. Since our results on Hypothesis 1 suggest superior stability characteristics of VBBs compared with GSIBs, we focus on whether the regulatory changes after the financial crisis had an impact on GSIBs stability levels. As a first indication to test Hypothesis 2, Fig. 1 presents the means of the z-score and modified z-score for the VBBs and the GSIBs. The pattern of the z-score and the modified z-score

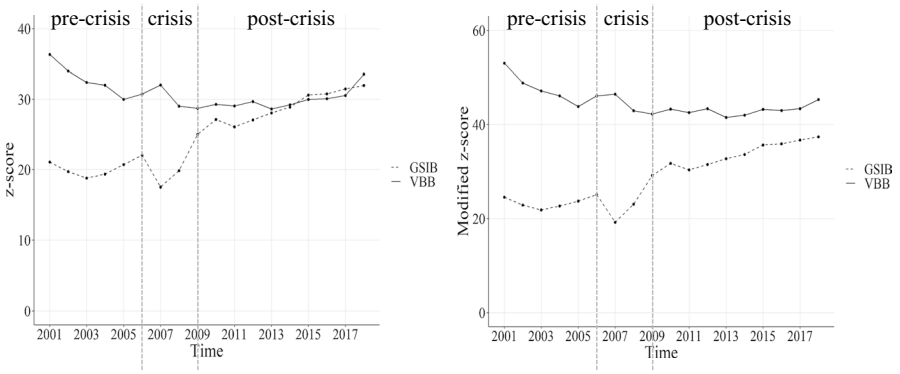

Fig. 1 Development of the z-score (left) and modified z-score (right) by bank type

indicates that VBBs have been significantly more stable than GSIBs before and during the financial crises. In the post-crisis period, the stability levels of both sample groups have converged over time. This development appears to be due to a substantial increase in stability levels for GSIBs, particularly since the financial crisis, which is likely to be driven by additional capital regulations imposed on GSIBs after the crisis (FSB, 2011).

Accordingly, we test Hypothesis 2 to understand whether the increase in stability in GSIBs was more substantial compared to the development in the stability indicators of the VBBs. To provide statistical inference, we perform a difference-in-differences (DiD) analysis to identify a possible relationship in the changes of stability levels after introducing additional capital requirements for GSIBs by the FSB (2011) in the post-crisis period. We choose 2011 as the start of the treatment period since the regulatory changes started to be effective in 2011 and later. It is unlikely that banks increased their equity before the regulatory environment forces them to do so.[4]

We consider the group of GSIBs as the treated group. In this difference-in-differences model, we estimate the differential effect of the regulatory changes on the stability measures of GSIBs during the post-treatment period (i.e., 2011 and later). We estimate this effect by comparing the average change over time in the stability measures for the GSIBs, compared to the average change over time for the VBBs. Applying the difference-in-differences model on our panel of GSIBs and VBBs evaluates the between-group differences of the changes in the stability measures that occur over time.

We create two dummy variables (1) TIME being 1 for 2011 and later and (2) TREAT being 1 for all GSIBs and zero for the VBBs. We refer to the interaction of TIME and TREAT as the DiD variable. The DiD variable coefficient represents the differential effect in the stability measures. To determine the differential effect of

[4] Since financial institutions aim to maximize their return on equity, they are unlikely to implement more severe restrictions on the equity buffer than the regulatory environment determines.

Table 5 Difference-in-differences analysis on the bank stability of VBBs and GSIBs after the regulatory changes in the aftermath of the financial crisis

	z-score	Modified z-score
DiD	6.669***	8.308***
	(0.852)	(1.158)
TIME	0.077	−0.707
	(0.570)	(0.775)
TREAT	−20.941**	−36.627***
	(0.852)	(12.925)
Intercept	9.469	19.030
	(27.603)	(40.766)
Bank FE	yes	yes
Observations	893	893
Adjusted R^2	0.028	0.005
F Statistic	10.285^{***}	8.179^{***}

This table shows the results of difference-in-differences models estimated in random effects panel regressions. Robust standard errors are clustered at the bank level. *$p<0.1$; **$p<0.05$; ***$p<0.01$

the treatment, we estimate specifications of the following difference-in-differences model in panel structure:

$$SM_{i,t} = \alpha + \beta_1 DiD_{i,t} + \beta_2 TIME_t + \beta_3 TREAT_i + Controls_{i,t} + Country_i + \varepsilon_{i,t}$$

Since the Hausman tests do not reject the hypothesis that all fixed effects are zero (p-values for z-score is 0.422 and for modified z-score is 0.378), we estimate random effects panel regressions to elicit the regulation effect on the stability measures. To capture the effect by which the developments in the crisis period (comprising the regulatory changes) had a more substantial effect on the GSIBs than the VBBs, we consider the DiD variable.[5]

To sum up, we record the following findings for the analysis of the stability measures (see Table 5): Firstly, while the average stability was significantly higher for VBBs before the crisis (see the results of the last subsection), regulation has reduced the distance between the stability measures of GSIBs and VBBs. This is shown by the positive significant DiD variable in the regressions explaining the stability measures. Hence, we find supporting evidence for Hypothesis 2.

[5] The results of this DiD analysis are robust to adding firm characteristics such as loans-to-assets, loan growth ratio, deposits-to-liabilities ratio, log(total assets), average GDP growth, average GDP per capita, and government debt-to-GDP ratio to the model. The results of this full model are avaialbe on request. Including the control variables, the Hausman test suggests fixed effects models.

Table 6 Stability measures by period, market state, and bank type

	Pre-crisis period			Crisis period			Post-crisis period		
	VBB		GSIB	VBB		GSIB	VBB		GSIB
	Dev	Emer		Dev	Emer		Dev	Emer	
z-score	40.48	16.42	20.31	37.86	14.27	21.62	38.22	14.90	29.09
t-stat		(−2.75)	(−2.26)		(−2.81)	(−1.88)		(−2.89)	(−1.10)
Modified z-score	57.17	29.61	23.58	53.06	25.02	24.95	52.87	25.61	33.90
t-stat		(−1.85)	(−2.40)		(−1.95)	(−2.14)		(−2.10)	(−1.58)
Std. Dev. z-score	36.01	7.81	12.91	41.46	8.56	19.37	39.35	8.93	16.46

The table reports the z-score and modified z-score separated by the type of bank (GSIB and VBB) and for VBBs from developed (Dev) and emerging (Emer) countries over the pre-crisis, crisis, and post-crisis periods. The numbers indicated are means. To avoid the overweighting of banks with high data availability, the means are calculated as the mean of all banks' means. The t-value (in parentheses) depicts the t-statistics for the difference in means between VBBs from developed to VBB from emerging countries and to GSIBs from developed countries

5.3 VBB stability and the development state of the home country

To gain additional insights into the variation of stability within the VBB sample, we analyze the stability of VBBs of different geographical locations, clustered as developed and emerging countries.[6] Table 6 depicts the mean values of the (modified) z-score of VBBs in developed and emerging markets and the (modified) z-score of GSIBs that are all located in developed markets. We report the respective statistics for three different periods, i.e., the pre-crisis, crisis, and post-crisis period. The *t*-statistics indicate that significant differences between VBBs in developed and emerging countries for both ratios exist throughout the entire period. The level of significance slightly increases from the pre-crisis period to the post-crisis period. Thus, VBBs from developed countries are more stable than VBBs from emerging countries, and the difference in stability levels is more prominent after the crisis.

Two potential explanations for this pattern include: Firstly, the distinction of the two country groups is mostly along the same dimensions as a distinction between ethical and poverty alleviation banks and, thus, very distinct business models and organizational structures (Scheire & de Maertelaere, 2009). This would imply that the business model of ethical banks in developed countries leads to significantly

[6] Developed countries include: Australia, Canada, China, Denmark, France, Germany, Greece, Italy, Japan, the Netherlands, Norway, Sweden, Switzerland, and the USA. Emerging countries include: Afghanistan, Bolivia, Dominican Republic, El Salvador, Malaysia, Mongolia, Nepal, Palestine, Paraguay, Peru, Philippines, Tajikistan, and Uganda.

lower returns, but also substantially lower volatility thereof, ultimately resulting in higher stability levels. Secondly, the difference in macroeconomic environments may impact the efficiency and return volatility of the respective banks.

Furthermore, Table 6 shows the comparison of the GSIB sample with VBBs from developed countries. The data confirm the results from the main analysis of the stability levels of the two types of banks but indicates that the higher stability of VBBs in developed countries loses significance at a later point in time compared to the overall sample. This is likely due to the inclusion of the comparably much lower stability levels exhibited by the VBBs from emerging countries. This result shows that VBBs from developed countries, which are more comparable to GSIBs in terms of geographic exposure and business models than poverty alleviation banks in emerging countries, exhibit significantly higher levels of stability than GSIBs.

Moreover, the international regulation for the banking sector has been applied differently, in particular, in the US and the European Countries (Pugliese, 2016). Therefore, we test whether the regional biases exist regarding the extent GSIBs improved their stability compared to VBBs after 2010. Therefore, we interact the DiD variable of Table 5 with a categorical variable for the region the bank is located in. This variable has three groups, i.e., (1) the US and Canada, (2) European countries, and (3) all other countries.[7] We explain the variation of the stability measures in a random effects panel model following a difference-in-differences setting. Similar to the results stated in Table 5, the DiD variable is the interaction term between the TIME variable and the TREAT dummy (GSIBs = 1). We add two interaction terms with the DiD variable for the region a bank is located in. Our reference category is the region of US and Canada. The interpretation of these two interaction terms is the following: A positive coefficient to such an interaction term indicates that the respective group of GSIBs exhibit a stronger increase in the dependent variable than the US and Canadian GSIBs after the changes in regulation became active. A negative coefficient indicates the opposite.

[7] All other countries include Afghanistan, Australia, Bangladesh, Bolivia, Dominican Republic, El Salvador, Japan, Malaysia, Mongolia, Nepal, Palestine, Paraguay, Peru, Philippines, Tajikistan, and Uganda.

Table 7 Difference-in-differences analysis with a regional focus on the bank stability of VBBs and GSIBs after the regulatory changes in the aftermath of the financial crisis

	z-score	Modified z-score
Regulation	0.076	−0.707
	(0.569)	(0.775)
GSIB	−20.665***	−36.255***
	(7.026)	(11.018)
DiD	12.096***	14.473***
	(1.452)	(1.977)
DiD × European Countries	−3.980**	−3.299*
	(1.451)	(1.974)
DiD × Other Countries	4.680***	6.020**
	(1.733)	(2.359)
Intercept	4.790	13.011
	(22.221)	(34.824)
Country	yes	yes
Observations	1123	1122
Adjusted R^2	0.120	0.085
p-value	0.000***	0.000***

This table shows the results of difference-in-differences models estimated in random effects panel regressions. The reference category is GSIBs from US and Canada. Robust standard errors are clustered at the bank level. *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$

The results in Table 7 show that European GSIBs increased the z-score significantly less compared to US and Canadian GSIBs. For the modified z-score, the direction of the result maintains, but the effect is not significantly different from zero. The more remarkable and more consistent improvement in both stability measures could be observed for the GSIBs from other countries. The higher increases in the stability of North American banks compared to European banks may be attributed to strict regulation after the financial crisis in the United States. President Obama signed the Dodd-Frank Act in 2010 as a reaction to the financial crisis in 2007 that limited the speculative banking activities substantially. The reason for the most substantial increase in the stability of other banks in the observation period may also be due to national regulatory changes. For instance, Japan faced a banking crisis from 1991 to 2005 and also developed its banking regulation significantly afterwards.

Table 8 Members of the global alliance for banking on values

1. **Alternative Bank Switzerland (Switzerland)**
2. *Amalgamated Bank (USA)*
3. *Banca Etica (Italy)*
4. *Banco Ademi (Dominican Republic)*
5. *Banco FIE (Bolivia)*
6. Banco Mundo Mujer (Colombia)
7. Banco Popular (Honduras)
8. Banco Solidario (Ecuador)
9. Bancompartir (Colombia)
10. *BancoSol (Bolivia)*
11. BANFONDESA (Dominican Republic)
12. *Bank Australia (Australia)*
13. **Bank of Palestine (Palestine)**
14. **Beneficial State Bank (USA)**
15. *BRAC Bank (Bangladesh)*
16. *Caisse d'economie solidaire Desjardins (Canada)*
17. Caja Arequipa (Peru)
18. *CARD Bank, Inc. (Philippines)*
19. **Centenary Bank (Uganda)**
20. Center-invest Bank (Russia)
21. Charity Bank (United Kingdom)
22. **City First Bank of DC (USA)**
23. *Cooperativa Abaco (Peru)*
24. *Cooperative Bank of Karditsa (Greece)*
25. *Crédit Coopératif (France)*
26. **Cultura Bank (Norway)**
27. **DAI-ICHI KANGYO Credit Cooperative (Japan)**
28. **Ecology Building Society (United Kingdom)**
29. *Ekobanken (Sweden)*
30. ESAF Small Finance Bank (India)
31. Folkesparekassen (Denmark)
32. **Freie Gemeinschaftsbank Genossenschaft (Switzerland)**
33. **GLS Bank (Germany)**
34. *Kindred Credit Union (Canada)*
35. LAPO Microfinance Bank (Nigeria)
36. MagNet Hungarian Community Bank (Hungary)
37. **Merkur Resource Bank (Denmark)**
38. **Missoula Federal Credit Union (USA)**
39. **Muamalat (Malaysia)**
40. **National Cooperative Bank (USA)**
41. New Resource Bank (USA)
42. *NMB Bank Limited (Nepal)*
43. Opportunity Bank Serbia (Serbia)
44. *SAC Apoyo Integral, S.A. (El Salvador)*
45. *Southern Bancorp (USA)*
46. **Sunrise Banks (USA)**
47. **The First Microfinance Bank Tajikistan (Tajikistan)**
48. **The First Microfinance Bank Afghanistan (Afghanistan)**
49. Teachers Mutual Bank Limited (Australia)
50. **Triodos Bank (Netherlands)**
51. *UmweltBank (Germany)*
52. *Vancity (Canada)*
53. *Verity Credit Union (USA)*
54. **Vermont State Employees Credit Union (USA)**
55. **Vision Banco (Paraguay)**
56. *XacBank (Mongolia)*

Source: GABV (2019a)

Legend: **Banks included in the study based on information provided (total: 20)**

Banks included in the study based on pre-filled data from GABV (total: 21)

Banks not included in the study (total: 15)

Table 9 The principles of values-based banking

Principle 1: Triple bottom line approach at the heart of the business model
Values-based banks integrate this approach by focusing simultaneously on people, planet and prosperity. Products and services are designed and developed to meet the needs of people and safeguard the environment. Generating reasonable profit is recognized as an essential requirement of values-based banking but is not a stand-alone objective. Importantly, values-based banks embrace an intentional approach to triple-bottom-line business—they don't just avoid doing harm, they actively use finance to do good
Principle 2: Grounded in communities, serving the real economy and enabling new business models to meet the needs of both
Values-based banks serve the communities in which they work. They meet the financial needs of these geographic and sector-based communities by financing enterprises and individuals in productive and sustainable economies
Principle 3: Long-term relationships with clients and a direct understanding of their economic activities and the risks involved
Values-based banks establish strong relationships with their clients and are directly involved in understanding and analyzing their economic activities and assisting them to become more values-based themselves. Proper risk analysis is used at product origination so that indirect risk management tools are neither adopted as a substitute for fundamental analysis nor traded for their own sake
Principle 4: Long-term, self-sustaining, and resilient to outside disruptions
Values-based banks adopt a long-term perspective to make sure they can maintain their operations and be resilient in the face of external disruptions. At the same time, they recognize that no bank, or its clients, is entirely immune to such disruptions
Principle 5: Transparent and inclusive governance
Values-based banks maintain a high degree of transparency and inclusiveness in governance and reporting. In this context, inclusiveness means an active relationship with a bank's extended stakeholder community, and not only its shareholders or management
Principle 6: All of these principles embedded in the culture of the bank
Values-based banks seek to embed these principles in the culture of their institutions so that they are routinely used in decision-making at all levels. Recognizing that the process of embedding these values requires deliberate effort, these banks develop human resources policies that reflect their values-based approach (including innovative incentive and evaluation systems for staff), and develop stakeholder-oriented practices to encourage values-based business models. These banks also have specific reporting frameworks to demonstrate their financial and non-financial impact

Source: GABV (2019b)

Table 10 List of global systematically important banks

1. Agricultural Bank of China (China)	16. ING Bank (Netherlands)
2. Bank of America (USA)	17. JP Morgan Chase (USA)
3. Bank of China (China)	18. Mitsubishi UFJ FG (Japan)
4. Bank of New York Mellon (USA)	19. Mizuho FG (Japan)
5. Barclays (UK)	20. Morgan Stanley (USA)
6. BNP Paribas (France)	21. Royal Bank of Canada (Canada)
7. China Construction Bank (China)	22. Santander (Spain)
8. Citigroup (USA)	23. Société Générale (France)
9. Credit Suisse (Switzerland)	24. Standard Chartered (UK)
10. Deutsche Bank (Germany)	25. State Street (USA)
11. Goldman Sachs (USA)	26. Sumitomo Mitsui FG (Japan)
12. Group Crédit Agricole (France)	27. UBS (Switzerland)
13. Groupe BPCE (France)	28. Unicredit Group (Italy)
14. HSBC (UK)	29. Wells Fargo (USA)
15. Industrial and Commercial Bank of China (China)	

Source: FSB (2018)

Table 11 Overview of variables and ratios

Ratio	Definition	Category
Asset growth (Asset_growth)	$\frac{(\text{Total assets}_t - \text{Total assets}_{t-1})}{\text{Total assets}_{t-1}}$	Descriptive statistic
Deposits-to-liabilities ratio (DTL)	$\frac{\text{Total deposits}}{\text{Total liabilities}}$	Bank-specific variable
Equity ratio (Equity_ratio)	$\frac{\text{Total equity}}{\text{Total assets}}$	CAMELS (C)
Leverage ratio (Lev)	$\frac{\text{Total liabilities}}{\text{Total assets}}$	Descriptive statistic
Loan growth (Loan_growth)	$\frac{(\text{Total gross loans}_t - \text{Total gross loans}_{t-1})}{\text{Total gross loans}_{t-1}}$	Bank-specific variable
Loans-to-assets ratio (Loan_to_ass)	$\frac{\text{Total gross loans}}{\text{Total assets}}$	Bank-specific variable
Loans-to-deposits ratio (LTD)	$\frac{\text{Total gross loans}}{\text{Total deposits}}$	CAMELS (L)
Modified z-score (Modified z-score)	$\frac{(\frac{\text{Equity}}{\text{Total assets}} + \text{ROA})}{\text{Downward volatility of ROA}}$	Stability measure
Non-performing loans-to-loans (NPL)	$\frac{\text{Nonperforming loans}}{\text{Total gross loans}}$	CAMELS (A)
Return on assets (ROA)	$\frac{\text{Net income}}{\text{Average totalassets}}$	CAMELS (A) / Descriptive statistic
Return on equity (ROE)	$\frac{\text{Net income}}{\text{Average total equity}}$	CAMELS (E) / bank-specific variable
Securities to assets (STA)	$\frac{\text{Total securities}}{\text{Totalassets}}$	CAMELS (S)
z-score (z-score)	$\frac{\frac{\text{Equity}}{\text{Total assets}} + \text{ROA}}{\text{Std.Dev. of ROA}}$	Stability measure

Sources: Betz et al. (2014), Cole and White (2012)

The table depicts the definitions and categories for all ratios calculated based on the data collected for this study. They may be included as descriptive statistics or as stability measures, vulnerability indicators, bank-specific variables in the regression model. Some ratios may be used for multiple categories. Abbreviations for the CAMELS indicators refer to capital adequacy (C), asset quality (A), management quality (M), earnings (E), liquidity (L), and sensitivity to market (S). *Note*: Due to a lack of data availability, not all measures could be used for analysis

6 Conclusion

In this paper, we investigate the stability of Values-Based Banks compared to that of the world's largest banks, the Globally Systemically Important Banks. We analyze the levels of stability exhibited by both bank types. Despite substantial heterogeneity within the VBB sample, VBBs show significantly higher levels of stability, particularly before and during the financial crisis of 2007. Changes in regulatory standards, improving the loss absorption capacities of GSIBs revokes this effect (Tables 8, 9, 10, and 11).

The findings add to the existing literature on general determinants of bank stability, values-based banking, and the effectiveness of banking regulation in the aftermath of the financial crisis for GSIBs. We enhance the former by providing support for existing research and as an indication that the values-based business model for banks may add positively to a bank's stability. Additionally, we enlarge the body of research on values-based banking, as this study is the first one to compare the stability of members of the GABV with the particularly stable sample group of GSIBs.

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