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Does competence of central bank governors influence financial stability?

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Abstract

This study investigates whether the competence of central bank governors affects the stability of the financial system they are responsible for. Using publicly available information about central bank governors from 2000 to 2016 together with data on financial stability and the macroeconomy, the findings reveal that central bank governors' competence promotes financial stability, depending on how competence is measured. Specifically, the findings reveal that the financial system is more stable when the central bank governor is older and male. The financial system is also stable during the tenure of a central bank governor that has a combination of cognitive ability, social capital and technical competence in economics. The gender analyses reveal that the financial system is also stable during the tenure of a female central bank governor that has high social capital or high cognitive abilities while the financial system is relatively less stable during the tenure of a male central bank governor that has high social capital or high cognitive abilities. Comparing developed countries to developing and transition countries, the findings reveal that the financial system of developed countries is more stable during the tenure of a central bank governor that has high cognitive ability, social capital and technical competence in economics while the financial system of developing and transition countries is less stable during the tenure of a central bank governor that has high cognitive ability, social capital and technical competence in economics. Also, there is evidence that the financial system of developing and transition countries is more stable during the tenure of a central bank governor that has knowledge in disciplines other than economics. The findings are consistent with the view that certain characteristics of central bankers shape their beliefs, preferences and choice of policy, which in turn, are consequential for policy outcomes during their tenure.

Keywords: Financial stability, Central bank governor, Financial system, Banking stability, Competence, Education, Gender, Financial institutions, Economics

JEL Classification: G21, G24

Introduction

Every country needs a stable financial system. Usually, the head of the government appoints a person who will be responsible to manage the financial system over a defined period of time. We call this individual 'the central bank governor,' although different countries may use different names to describe the individual such as 'chief regulator,' 'central bank leader,' etc. The central bank governor is responsible for financial stability in the financial system and is also responsible for macroeconomic stability

in the economic system [1]. The central bank governor is also responsible for ensuring that financial institutions in the financial sector provide funds to the real sector for the production of goods and services, thus leading to economic growth. To achieve the goals of financial and macroeconomic stability, central bank governors are expected to use their competence—skills, knowledge and experience—and should work with other parties to manage the financial and economic system [1].

The competence of central bank governors can influence the extent of financial regulation, the severity of regulatory sanctions, the level of systemic risks in the financial system, the kind of monetary policy decisions

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that are made, how the economy is managed and the type of interventions in the economy during bad times in a country [2]. Romer and Romer [3] show that the choice of central bank governor can substantially influence policy outcomes, especially factors such as some education in economics, experience on Wall Street, experience in public service and their own writings and statements. These two studies have shown that the competence of central bank governors can influence policy outcomes, which suggest that competence should be taken into consideration when choosing central bank governors. But no studies have examined the relationship between central bank governors' competence and financial stability, and this is the gap in the literature which this study seeks to fill.

Existing studies on financial stability focus largely on financial crisis scenarios and stress testing [4, 5], financial stability determinants [6, 7], the effect of central bank governor changes on stock markets [8], the effect of past employment and educational characteristics of central bank governors in the design of financial regulation [1] and the factors that propagate contagion in financial systems [9, 10]. But these studies did not explore the role of the competence of central bank governors in influencing the policies that financial stability depends on. This paper is the first attempt to examine the relationship between central bank governor's competence and financial stability.

Does the competence of the central bank governor affect financial stability? This is the question we address in this paper. If a new central bank governor is appointed by the government on the basis of competence alone, will superior (or poor) competence be the reason for financial stability (or instability)? Surprisingly, there is scant empirical research addressing this question. We focus on 'competence' which is a specific characteristic of central bank governors. In the literature, competence is a characteristic of an individual that has been shown to drive superior job performance [11, p. 107], such as visible knowledge, skill, experience and other underlying elements of competencies like traits and motives [12]. We focus on the 'competence' of the central bank governor because of the prevailing view in central banking settings that the central bank governor's experience and competence is an important determinant of which policies are implemented and which policies are not implemented during their tenure [1]. Yet, research in finance and economics so far has given little consideration to how the central bank governor's characteristics affect financial stability.

Using a dataset of publicly available information on central bank governors, this paper examines whether the competence of central bank governors is a determinant of financial stability during their tenure. Using the

fixed-effect regression methodology, the findings reveal that (1) the central bank governor's competence promotes financial stability, (2) the financial system is more stable during the tenure of a central bank governor that is male and older, (3) the financial system is also stable during the tenure of a central bank governor that has a combination of cognitive ability, social capital and technical competence in economics. The findings from the gender analyses reveal that the financial system is also stable during the tenure of a female central bank governor that has high social capital or high cognitive ability. Also, there is evidence that the financial system of developing and transition countries is more stable during the tenure of a central bank governor that has knowledge in disciplines other than economics.

This paper makes several contributions to the literature. Firstly, we add to the financial stability literature by introducing the competence of the central bank governor as a determinant of financial stability. Secondly, the study contributes to the literature that examine the effect of central bank governors' characteristics on financial regulation (see [1, 2, 8]). These studies show that certain characteristics of central bank governors can influence the dynamics of financial regulation. Finally, our analysis contributes to the literature that identify the determinants of financial crises (see [7, 13]). The analysis in this study focuses on established indicators of financial stability and shows how stability outcomes may depend on the competence of central bank governors.

The rest of the paper is organised as follows. 'Theoretical framework' section presents the theoretical framework. 'Related literature and hypothesis development' section presents the related literature and develops the hypothesis. 'Methods' section presents the data and methodology. 'Results and discussion' section reports the empirical results. 'Conclusion' section concludes.

Theoretical framework

Upper echelon theory

The competence of central bank governors can be understood in the context of upper echelon theory. Upper echelon theory is a management theory which states that an organisation is a reflection of the characteristics of its top-level management team [14]. It argues that the strategic decisions and policies adopted by members of an organisation's upper echelon are a reflection of their personal experiences, values, personalities, managerial background and other similar characteristics. This implies that the executives' experiences, values and personalities can influence their interpretations of the situations they face and, in turn, can affect their choices [15]. Therefore, following the upper echelon theory, central bank governors' characteristics can influence the interpretation of

the situations they face in managing the financial system and, in turn, can affect their choice of policy to correct financial imbalances in the financial system. Thus, to better understand the policies underlying financial system stability, one should understand the characteristics of the central bank governors who lead the policy making process.

Competence

Competence is a characteristic that drive superior job performance by an individual such as visible knowledge, skill, experience, traits and motives [16, 17]. Weinert [18] identified nine different ways in which competence has been defined or interpreted. These include: general cognitive ability; specialised cognitive skills; competence performance model; modified competence-performance model; objective and subjective self-concepts; motivated action tendencies; action competence; key competencies; meta-competencies. Also, resource-based theory suggests that managers can offer two types of resources: human capital as indicated by their experience [19, 20], and 'social capital' as indicated by their external ties to politicians, business elites and government officials [21, 22]. These two resources 'human capital' and 'social capital' can help central bank governors to leverage and exploit other resources to improve the way they manage the financial system.

Should the central bank governor matter?

There are three perspectives on this. The first perspective is the 'heterogeneous and collaborative leader' perspective. Under this perspective, the central bank governor can be viewed as an agent who introduces heterogeneous and selfless inputs into the financial system regulatory process. The agent allows external parties and other interested parties to participate and contribute some significant inputs into the policy making process. The agent oversees the process and is advised on which policy options should be enforced. Decisions are made collectively, and the agent is expected to endorse the collective decisions of the team. Under this perspective, the central bank governor (the agent) does not matter for what is going on within the regulatory policy setting because replacing one central bank governor with another central bank governor will not significantly affect the nature and intensity of financial regulation which financial stability depend on.

The second perspective is the 'homogenous and self-serving leader' perspective. Under this perspective, the central bank governor can be viewed as an agent who introduces competence as personalised inputs gained from experience, education and association, into the decision making process for financial regulation. The

agent does not allow external parties to participate or contribute to the policy making process, preferring to work only with existing regulatory officials. The agent introduces a significant amount of personalised decisions into the regulatory process and may seek counsel from existing regulatory officials to determine which policy options should be enforced in the financial system. Under this perspective, the central bank governor matter for what is going on within the regulatory policy setting because replacing one central bank governor with another central bank governor will significantly affect the nature and intensity of financial regulation which financial stability depends on.

The third perspective is the 'performance contract' perspective. This perspective partly aligns with agency theory in that it argues that the central bank governor has significant discretion and can use his or her competence to alter policy decisions to advance what he or she thinks is the right thing to do. The central bank governor can impose his or her own idiosyncratic regulatory style on the financial sector. If the central bank governor's regulatory style does not promote greater stability in the financial system, the central bank governor will be pressured to change his or her regulatory style by the Board or through regulatory gaming by regulated entities. And of course, the extent to which this can occur will depend on whether the Board has the ability to control the decisions of the central bank governor. Most often, the central bank governor is a political executive and has greater power than the members of the Board combined, which can limit the ability of the Board to control the decisions of the central bank governor. Under this perspective, the central bank governor matters for what is going on within the regulatory policy setting.

Related literature and hypothesis development

Related literature

Some studies investigate the personality traits of central bank governors, and the factors that lead to the appointment and exit of central bank governors. For instance, Romer and Romer [3] argue that an important determinant of policy success of a central bank governor is the central bank governor's views about how the economy works and his or her views on what monetary policy can accomplish. This suggests that the choice of a central bank governor is based on the individual's personal idiosyncrasies such as their own writings and statements on the economy. Other studies examine the causes and effect of the appointment of a new central bank governor. Kuttner and Posen [2] examine the effects of the appointment of central bank governors and financial market expectations on monetary policy. They conducted an event study based on dataset of appointment

announcements from 15 countries. They find that there was a significant reaction of exchange rates and bond yields to unexpected appointments of central bank governors. Other studies examine the factors that lead to the exit of central bank governors. Dreher et al. [23] examine the factors that lead to the removal of a central bank governor before the end of their tenure. They conducted multi-country analyses and found that political instability, regime instability, the occurrence of elections and the ratio of private credit to GDP increases the likelihood of central bank governor exit before the end of their tenure. They also observe that different factors lead to the removal of central bank governors in OECD countries versus non-OECD countries while factors such as frequent elections were a common factor in the two country-group. Also, Moser and Dreher [8] examine the reactions of financial markets to central bank governor exits. Using daily dataset for 20 emerging markets during 1992–2006, they find that the replacement of a central bank governor negatively affected financial markets on the announcement day. Their findings suggest that newly appointed central bank governors suffer from a systematic credibility problem at the beginning of their tenure. Ennsner-Jedenastik [24] show that central bank governors that are affiliated with the ruling political party are more likely to survive to the end of their tenure compared to central bank governors that affiliated with the opposition party.

The financial stability literature so far has not addressed the question of whether the central bank governor's competence promotes or hinder sustained stability in the banking system. While this is an important question, the extent to which this question can be answered depends on what we mean by financial stability. There are numerous definitions for financial stability. For instance, financial stability is the absence of financial crises or the ability of the financial system to withstand shocks. Some scholars link financial stability to banking stability. Brunnermeier et al. [13] demonstrate that banking stability is the absence of banking crises which is achieved through the stability of all banks in the banking sector. Similarly, Segoviano and Goodhart [25] argue that banking stability is the stability of banks linked to each other directly through the interbank deposit market and participations in syndicated loans or indirectly through lending to common sectors and proprietary trades. A stable banking system will efficiently allocate resources from savers to borrowers, manage lending risks and maintain manageable levels of risk. On the other hand, banking system instability occurs when the banking system fails to perform its function, leading to a crisis. A resilient and stable financial system will absorb abnormal shocks primarily through self-corrective mechanisms to prevent adverse

events from having a disruptive effect on the financial system and the real economy. A stable financial system is also resilient to stress [26–28].

Hypothesis development

Specialist education hypothesis

The education of the central bank governor can influence financial system stability. This is because one of the key qualities of a successful central bank governor is being knowledgeable about the exact workings of financial markets and economic systems which requires a thorough understanding of the economics discipline [16]. Having specialist knowledge of the economics discipline allows the central bank governor to use his or her knowledge and available information to make robust policy decisions to ensure stability in the financial system [29]. Therefore, we predict a positive relationship between the central bank governor's competence (measured as education in economics) and financial system stability. Our methodology for determining the competence of central bank governors is a Ph.D. in economics. Our argument for this metric is based on the fact that a Ph.D. in economics ensures at least a good understanding of macroeconomics.

H1 Central bank governors' competence, measured as education, positively influence financial stability.

Cognitive ability hypothesis

The cognitive ability of the central bank governor can influence financial system stability. This is because one of the key qualities of a successful central bank governor is his or her ability to put together and use all available information to make key policy decisions to promote stability in the financial system. A measure of cognitive ability is the quality of University attended according to Gottesman and Morey [30]. Being educated at an elite University can improve the central bank governor's ability to process large information which should positively correlate with his or her ability to design policies that promote stability in the financial system. Additionally, a central bank governor that was educated in a global elite university will have more mentoring opportunities from the best economists in elite universities and will have valuable networking opportunities with other foreign policy makers who visit elite institutions to attend policy conferences. Moreover, research in psychology¹ has shown that individuals with higher intelligence, regardless of

¹ Deary [31].

how intelligence is measured, are able to process existing and new information more quickly than less intelligent individuals [31]. Our method for determining the cognitive ability of a central bank governor is to use the prestige of the higher institution or university attended by the central bank governor as a proxy for his or her cognitive ability. This means that a central bank governor that attended an elite university is considered to have high cognitive abilities based on the fact that the entrance requirements and standards to study in elite universities are high, and one's ability to gain entry into an elite university's program is indicative of high intelligence. Therefore, we expect a positive relationship between higher cognitive ability and financial stability.

H2 Central bank governors' competence, measured as cognitive ability, positively influences financial system stability.

Social capital hypothesis

Daily and Johnson [32] show that executives with foreign or elite education have more influence and social capital in their organisations. For this study, social capital refers to social ties and networks gained by the central bank governor because of his or her foreign education. The foreign education of the central bank governor provides a measure, to some extent, of the central bank governor's social capital, and it is well known that foreign education can be a strong indicator of social prestige and class status [33]. Indeed, one can posit that a large part of why the central bank governor rose to his or her position of influence, or why he or she was politically appointed is partly due to their social networks gained through their foreign education. In addition to using social capital for personal advancement in his or her career, the central bank governor can use his or her social capital and social networks to solicit advice from foreign central bank governors if necessary. For example, a central bank governor with strong social ties to regulators in other countries can receive solutions to solve tough economic problems. Our method for determining the social capital of the central bank governor is whether the central bank governor obtained his or her highest educational qualification from a foreign university. Our argument for this metric is based on the fact that those educated in foreign universities benefit from networking opportunities with their peers and also benefit from mentoring opportunities by top scholars in economics and finance. Therefore, we expect a positive relationship between the central bank governor's social capital and financial system stability.

H3 Central bank governors' competence, measured as social capital, influences financial system stability.

Methods

Data

The central bank governor, in this study, refers to the governor of each national central bank, which excludes the governor of regional central banks such as the European central bank and the central bank of West African States (WAEMU). The information of central bank governors was collected for 40 countries covering the 2000–2016 period. The biological information and information on the competence of the central bank governor such as their exact age, gender and education characteristics was collected from multiple public sources mainly: the official Wikipedia page of the central bank governor, publicly available (or online) curriculum vitae of central bank governors and from central bank websites (see Table 1).

During our data collection process, each information collected from one public source was compared with the same information reported in other public sources to ensure the data is consistent and accurate. However, we observed that many countries did not have any publicly available information about their central bank governors. A basic internet search showed that there was limited information about the age and education of the central bank governor for many countries. Also, we noticed that many countries had incomplete publicly available information about their central bank governors and such incomplete data could introduce bias in the data. There were also cases where the biological information of the central bank governors for some countries was not sufficient enough to cover a 16-year period (2000–2016). Therefore, for data quality reasons, we excluded the countries that do not have any publicly available information, we also excluded countries that have incomplete data about their central bank governors as well as countries that had a short reporting history of information about central bank governors. After removing these countries, we made sure that there is a balanced country sample, for instance, we ensured that the sample contain countries that have had a female central bank governor in the past to enable comparison with their male counterparts. Also, we did not include some countries that have had an all-male governor in their central banking history in order to have a more fairly balanced sample. We also included some developing countries into the sample—although this category was fewer due to unavailable or incomplete information. The resulting final sample consist of 16 countries that met the selection criteria.

Macroeconomic data were also collected, to capture the effect of the macroeconomy on financial stability, from

Table 1 Information on central bank governors

S/N	Country	Name	Year	Gender	Obtained Ph.D. Economics before appointment
1.	USA	Alan Greenspan	2000–2005	M	Yes
		Ben Bernanke	2006–2013	M	Yes
		Janet Yellen	2014–2016	F	Yes
2.	UK	Edward Alan John George	2000–2002	M	No
		Mervyn King	2003–2012	M	No
		Mark Carney	2013–2016	M	Yes
3.	Italy	Antonio Fazio	2000–2004	M	No
		Draghi	2005–2010	M	Yes
		Ignazio Visco	2011–2016	M	Yes
4.	Germany	Ernst Welteke	2000–2003	M	Yes
		Axel Alfred Weber	2004–2010	M	Yes
		Jens Weidmann	2011–2016	M	Yes
5.	France	Jean-Claude Trichet	2000–2002	M	No
		Christian Noyer	2003–2014	M	No
		François Villeroy De Galhau	2015–2016	M	No
6.	Russia	Viktor Gerashchenko	2000–2001	M	No
		Sergey Ignatyev	2002–2012	M	Yes
		Elvira Nabiullina	2013–2016	F	Yes
7.	South Africa	Tito Mboweni	2000–2008	M	No
		Gill Marcus	2009–2013	F	No
		Lesetja Kganyago	2014–2016	M	No
8.	Canada	Gordon Thiessen	2000	M	Yes
		David A. Dodge	2001–2007	M	Yes
		Mark Carney	2008–2012	M	Yes
		Stephen Poloz	2013–2016	M	Yes
9.	Malaysia	Zeti Akhtar Aziz	2000–2015	F	Yes
		Muhammad Bin Ibrahim	2016	M	Yes
10.	Botswana	Linah Mohohlo	2000–2016	F	No
11.	Nigeria	Joseph Sanusi	2000–2004	M	No
		Charles Soludo	2005–2009	M	Yes
		Sanusi Lamido	2009–2014	M	No
		Emefiele Godwin	2014–2016	M	No
12.	Serbia	Mladen Dinkić	2000–2003	M	No
		Kori Udovički	2003–2014	F	Yes
		Radovan Jelašić	2004–2010	M	No
		Dejan Šoškić	2010–2012	M	No
		Jorgovanka Tabaković	2012–2016	F	Yes
13.	Thailand	Chatumongol Sonakul	2000–2001	M	No
		Pridiyathorn Devakula	2001–2006	M	No
		Tarisa Watanagase	2006–2010	F	Yes
		Prasarn Trairatvorakul	2010–2015	M	No
		Veerathai Santiprabhob	2015–2016	M	Yes
14.	China	Dai Xianglong	2000–2002	M	No
		Zhou Xiaochuan	2002–2016	M	No
15.	Mexico	Guillermo Ortiz Martínez	2000–2009	M	Yes
		Agustín Carstens	2010–2016	M	Yes

Table 1 (continued)

S/N	Country	Name	Year	Gender	Obtained Ph.D. Economics before appointment
16.	Argentina	Pedro Pou	2000–2001	M	No
		Aldo Pignanelli	2002	M	No
		Hernán Martín Pérez Redrado	2003–2009	M	No
		Mercedes Marcó del Pont	2010–2011	F	No
		Juan Carlos Fábrega	2013	M	No
		Alejandro Vanoli	2013–2015	M	No
		Federico Sturzenegger	2016	M	No

the World Economic Forum database. Data for financial stability indicators were collected from the World Bank’s Global Financial development indicators database. The financial stability indicators are the dependent variables. The countries in our sample include: USA, UK, Italy, Germany, France, Russia, South Africa, Canada, Malaysia, Botswana, Serbia, Nigeria, Thailand, China, Mexico and Argentina. Finally, the descriptive statistics for the data are reported in Appendix Table 10.

Model specification

In the model, financial stability is expressed as a function of the competence of the central bank governor, the biological characteristics of the central bank governor and the macroeconomic factors affecting financial stability

$$\begin{aligned}
 SBi, t = & \alpha + \beta 1PEi, t + \beta 2EEi, t + \beta 3EAi, t \\
 & + \beta 4PDi, t + \beta 5AGEi, t + \beta 6MALEi, t \\
 & + \beta 7FEMALEi, t + \beta 8INFi, t \\
 & + \beta 9INTi, t + \beta 10GDPri, t + e
 \end{aligned}$$

where SB=a vector of dependent variables representing LLC, RISK, NPL and CAR. LLC=loan loss provisions to nonperforming loans ratio (%), CRISIS = banking crisis dummy variable (1=banking crisis, 0=none), RISK=bank Z-score, NPL=bank nonperforming loans to gross loans ratio (%), CAR=bank regulatory capital to risk-weighted assets ratio (%), PE=technical competence, measured by whether central bank governor had a Ph.D. in economics prior to being appointed, EE = cognitive ability, measured by whether the central bank governor was educated in a global elite university or institution prior to being appointed, EA=social capital, measured by whether the central bank governor had foreign education, PD=technical knowledge in a discipline other than economics, measured by whether the central bank governor has a specialist knowledge in disciplines other than Economics prior to being appointed, AGE = the age

of the central bank governor, MALE=a dummy variable that take the value ‘1’ if the governor is male, and ‘0’ if female, FEMALE=a binary variable that take the value ‘1’ if the governor is female, and ‘0’ if male, INF=inflation rate, INT=real interest rate, GDPGR=GDP growth rate, e=error term.

Appendix Table 11 presents the variable description.

Justification of variables

The financial stability vector variable (SB) is the dependent variable. The SB variable is a vector of four dependent variables that represent different measures of financial stability namely the z-score which measures insolvency risk (RISK), nonperforming loan ratio (NPL), regulatory capital ratio (CAR) and loan loss coverage ratio (LLC). The first dependent variable is the ‘RISK’ variable. ‘RISK’ is measured using the z-score² which represent the level of insolvency risk in the banking system [7, 17]. A high RISK value indicates that the banking sector is more stable because it is inversely related to the probability of bank insolvency [17], and the expectation is that a central bank governor would ensure that the banking system has a low level of insolvency risk during their tenure, leading to greater financial stability.

The second dependent variable is the level of nonperforming loans (NPL) which measures asset quality. The NPL variable is commonly used in the literature to measure financial stability [7, 34–36]. A low NPL ratio indicates high asset quality, and high asset quality in the banking sector generally improves financial stability. The expectation is that a central bank governor would ensure that the banking system has a low level of nonperforming

² The z-score measures the insolvency risk of the banking sector calculated at bank level as return on assets (ROA) plus the capital-to-asset ratio (CAR) divided by the standard deviation of asset returns. $RISK = Zscore = (ROA + CAR) / SDROA$, where ROA is the rate of return on assets, CAR is the capital to asset ratio, and SDROA is an estimate of the standard deviation of the rate of return on assets.

loans, which improves financial stability. The third dependent variable is the 'LLC' variable, measured as the ratio of loan loss provisions to nonperforming loans. The LLC ratio measures the extent that nonperforming loans are covered by loan loss provisions. The LLC ratio is commonly used in the literature to measure financial stability [37]³. A high LLC ratio indicates higher safety against expected loan losses in the banking system which also improves financial system stability. The expectation is that a central bank governor would ensure the banking system has a high loan loss coverage ratio.

The fourth dependent variable is the regulatory capital variable 'CAR'. The CAR ratio reflects the capital that banks are required to set aside for the risks they take [38, 39]. A high CAR ratio indicates that the banking system is well-capitalised and has the capacity to absorb unexpected losses and is, therefore, safe [13]. The expectation is that the central bank governor would ensure the banking system has high regulatory capital ratio to mitigate unexpected losses and other negative spill-overs from the risk-taking activities of financial institutions. The fifth dependent variable is the 'CRISIS' variable. The CRISIS variable is a binary variable which measures whether the banking system has witnessed a significant financial distress, (as indicated by significant bank runs, sudden banking system shutdown, losses in the banking system and/or bank liquidations) during the period. The CRISIS variable takes the value '1' if there has been a significant banking crisis, and '0' otherwise.

The explanatory variables are the competence variables, biographical characteristics variables and the macroeconomic variables. The competence of the central bank governor is measured using four variables: technical knowledge in economics (PE), cognitive ability (EE), social capital (EA) and knowledge in a discipline other than economics (PD). The 'PE' variable reflects central bank governors' technical knowledge in economics, which signals their ability to manage the economy and the financial system. The 'PE' variable is measured by whether the central bank governor obtained a Ph.D. in economics before being appointed as governor of the central bank [16, 29]. Göhlmann and Vaubel [29] confirms that knowledge of economics is crucial to manage any financial and economic system [29]. The PE variable takes the value '1' if the central bank governor had a Ph.D. in economics prior to appointment, and zero otherwise. The expectation is that there should be greater financial stability and greater macroeconomic stability during

the tenure of a central bank governor that has technical knowledge in economics.

The 'EE' variable reflects the cognitive ability of the central bank governor. Deary [31] show that individuals with high intelligence, regardless of how intelligence is measured, are better able to process existing and new information more quickly than less intelligent individuals [40]. The EE variable is measured by whether central bank governors obtained their highest qualification from a global elite university or learning institution.⁴ Elite universities establish a rigorous selection process in selecting new students to be admitted for specific academic programs so that only the best and the most intelligent are selected [41, 42]. Therefore, gaining entry into an elite academic institution is used as a proxy for high intelligence or high cognitive ability particularly in elite institutions such as Harvard, Yale, MIT, Stanford, Princeton, Pennsylvania, Cambridge and Oxford Universities. Accordingly, the 'EE' variable takes the value '1' if the central bank governor obtained his or her highest educational qualification from a global elite university, and zero otherwise. More specifically, the 'EE' variable takes the value '1' if the central bank governor obtained his or her highest educational qualification from Harvard, Yale, MIT, Stanford, Princeton, Pennsylvania, Cambridge and Oxford Universities, and take the value '0' if central bank governors did not obtain their highest degrees from elite universities. The expectation is that there should be greater financial stability and greater macroeconomic stability during the tenure of a central bank governor with high cognitive ability.

The 'EA' variable measures the social capital of central bank governors which is gained mostly through foreign education. The social capital gained through foreign education helps central bank governors to increase their extensive social networks, interpersonal relationships, shared understanding, shared norms and shared values derived from their exposure to alternative economic systems, their exposure to different schools of economic thought and their exposure to foreign banking systems and environment. This is also consistent with social capital theory which argue that social relationships are resources that can lead to the development and accumulation of human capital [43]. Having foreign education increases social capital because it gives the central bank governor an opportunity to meet new people, learn about

³ <https://economictimes.indiatimes.com/industry/banking/finance/banking/provision-coverage-ratio-of-psu-banks-on-the-rise-crosses-66/articleshow/67309291.cms?from=mdr>.

⁴ The global elite universities or learning institutions are—Harvard, Yale, MIT, Stanford, Princeton, Pennsylvania, Cambridge and Oxford Universities. The 'EE' variable takes the value '1' if the central bank governor obtained his or her highest educational qualification from Harvard, Yale, MIT, Stanford, Princeton, Pennsylvania, Cambridge and Oxford Universities, and take the value '0' if central bank governors did not gain their highest degrees from these universities.

new systems and build new relationships that allows for social networking in areas of shared interests, norms and values. The 'EA' variable takes the value '1' if the central bank governor obtained his/her highest educational qualification from a foreign university or learning institution, and '0' otherwise. The expectation is that there should be greater financial stability and greater macroeconomic stability during the tenure of a central bank governor that has high social capital gained through foreign education. The 'PD' variable reflects the central bank governor's technical knowledge in disciplines other than economics such as having a master's degree in finance, accounting or business administration, as well as having a Ph.D. in finance, accounting or management or having some professional certifications which signals the central bank governor's knowledge in a specific discipline. The PD variable takes the value '1' if the central bank governor has technical knowledge in a discipline other than economics prior to appointment, and zero otherwise. The expectation is that there should be greater financial stability and greater macroeconomic stability during the tenure of a central bank governor that has technical knowledge in non-economics discipline.

We also control for some biological characteristics of the central bank governor using the age and gender of the governor. The 'AGE' variable measures the exact age of the central bank governor. Generally, older executives have more experience in business management and tend to become more risk-averse as they grow older compared to younger executives since older executives tend to apply conservative discretion when making strategic decisions in organisations [44, 45]. Similarly, we expect that older central bank governors would be risk-averse in their regulatory policy making and ensure that the risks in the financial system is low to promote stability in the financial system. Therefore, the expectation is that older central bank governors would be more risk averse, which is beneficial for the financial system.

We also control for the influence of gender on financial stability. The literature has examined the effect of CEO gender on firm performance (see [46, 47]). Similarly, we seek to identify the effect of central bank governors' gender on financial stability. To do this, two gender binary variables were introduced into the model, namely: 'MALE' and 'FEMALE'. The 'MALE' binary variable takes the value '1' if the central bank governor is male and '0' if female, while the 'FEMALE' binary variable takes the value '1' if the central bank governor is female and '0' is male.

Finally, we control for the possible effect of macroeconomic factors on financial stability such as inflation, real

interest rate and GDP growth rate (GDPR). High inflation and high real interest rates will make lending costlier which will increase the cost of financial intermediation which, in turn, can trigger defaults on loan repayments and lead to instability in the financial system [48–50]. The GDP growth rate variable (GDPR) reflects the state of the business cycle. The state of the business cycle, such as economic downturns and upturns, can affect financial stability, and there is evidence that financial systems tend to be stable in periods of economic prosperity while financial systems tend to be unstable during economic recessions [51, 52].

The fixed-effect regression estimator was used to estimate the effect of central bank governor's competence on financial stability. An alternative estimation technique is the GMM regression estimator. The GMM reduces the degrees of freedom and further reduces the number of observations in the sample due to the lagged dependent variable in the estimation. The potential reduction in the number observations when GMM is used, the presence of many binary variables and the possible collinearity among the binary variable makes it inappropriate to use GMM. Therefore, the fixed-effect regression estimator was used.

Results and discussion

Main results

The empirical result is reported in Table 2. Using the 'LLC' variable as the dependent variable for financial stability in Column 1 of Table 2, the competence variables (PE, EE and EA coefficients) are insignificant except for PD coefficient. The PD coefficient is negative and significant, which indicates that the financial system has less safety against expected losses during the tenure of a central bank governor that has technical knowledge in other disciplines other than economics. The AGE coefficient is positive and significant, which confirms the expectation that older chief executives (such as a central bank governor) are more risk-averse as they get older, and this is consistent with Nakano and Nguyen [44] and Peni [45]. The result suggests that older central bank governors ensure that the financial (banking) system has high level of provisions to nonperforming loans ratio to cover expected losses during their tenure which improves financial stability. For the macroeconomic variables, only the GDPR coefficient is positive and significant, which suggest that the financial system has greater safety during economic booms.

Using the 'NPL' variable as the dependent variable for financial stability in Column 2 of Table 2, the EE coefficient is positive and significant, which indicates that

Table 2 Effect of competence on financial stability

	(1) LLC	(2) NPL	(3) CAR	(4) CRISIS	(5) RISK
	Coefficient (t-statistic)	Coefficient (t-statistic)	Coefficient (t-statistic)	Coefficient (t-statistic)	Coefficient (t-statistic)
C	24.987 (1.43)	7.417* (1.83)	11.899*** (5.18)	0.641** (2.60)	16.263*** (5.31)
PE	−5.517 (−0.79)	1.182 (0.70)	1.697* (1.78)	0.035 (0.33)	−1.379 (−1.07)
EE	−3.408 (−0.54)	2.675* (1.94)	1.006 (1.29)	0.131 (1.49)	−0.732 (−0.68)
EA	2.729 (0.50)	−1.255 (−0.97)	0.782 (1.08)	−0.077 (−0.91)	1.031 (1.05)
PD	−14.203** (−1.98)	−3.713** (−2.17)	1.508 (1.54)	0.093 (0.78)	−1.077 (−0.81)
AGE	0.756*** (2.84)	−0.014 (−0.23)	0.019 (0.55)	−0.009*** (2.61)	−0.029 (−0.61)
GDPR	1.077* (1.86)	0.054 (0.36)	−0.041 (−0.45)	−0.014 (−1.64)	0.024 (0.22)
INF	0.198 (0.96)	−0.029 (−0.28)	0.063 (0.95)	0.0013 (0.43)	−0.058 (1.52)
INT	−0.403 (−1.18)	0.160* (1.68)	−0.123* (−1.91)	0.015*** (2.86)	−0.058 (0.93)
R ²	84.94	64.19	64.17	47.86	74.06
Adjusted R ²	81.63	56.20	57.17	35.95	68.81
F-statistic	25.61	8.04	8.14	4.02	14.12
Fixed effect	Yes	Yes	Yes	Yes	Yes
Observations	206	204	199	200	221

The results in this table are estimated using fixed-effect regression. Country and period fixed effect were applied

***, **, * represent significance at 1%, 5%, 10%

there is a positive association between nonperforming loans and a central bank governor's social capital. This implies that appointing central bank governors based on their social capital and social ties leads to higher nonperforming loans, and subsequently, financial instability. This result is contrary to our expectation. One explanation for this result is that central bank governors that have strong social capital can make financial institutions lend money to business owners that have social ties with the central bank governor, and these business owners may not repay their loans. The PD coefficient is also negative and significant, which indicates that the financial system has higher nonperforming loans during the tenure of a central bank governor that has knowledge in disciplines other than economics. This may be attributed to lack of knowledge in economics which is essential for effective macroeconomic management. As expected, INT coefficient is positive and significant, which suggests that high real interest rate makes lending costlier and increases the cost of financial intermediation which, in turn, can trigger defaults on loan repayments and can lead to financial instability [48–50].

Using the 'CAR' variable as the dependent variable for financial stability in Column 3 of Table 2, the PE coefficient is positive and significant, which indicates that there is a positive association between regulatory capital ratios and a central bank governor's technical knowledge

in economics. This implies that the financial system has higher regulatory capital ratios when the central bank governor has a Ph.D. in economics which signals his/her technical competence. The other competence variables (EE, EA and PD coefficients) are insignificant. As expected, the INT coefficient is positive and significant, which suggest that high real interest rates make lending costlier and increase the cost of financial intermediation, which will make regulators increase the regulatory capital ratios that banks have to keep in anticipation of loan defaults due to high interests.

Using the 'CRISIS' variable as the dependent variable for financial stability in Column 4 of Table 2, the competence variables (PE, EE, EA and PD coefficients) are insignificant. The AGE coefficient is negative and significant, which indicates that there is a negative relationship between older central bank governors and financial crises, which implies that there are fewer financial crises during the tenure of older central bank governors. Also, the INT coefficient is positive and significant, which suggest that high real interest rates can increase the cost of lending and can trigger a liquidity crisis which can also lead to a system-wide financial crisis. Using the 'RISK' variable as the dependent variable for financial stability in Column 5 of Table 2, the result is not significant for all the variables.

Table 3 Effect of being a male governor on financial stability

	(1) LLC	(2) NPL	(3) CAR	(4) CRISIS	(5) RISK
	Coefficient (t-statistic)	Coefficient (t-statistic)	Coefficient (t-statistic)	Coefficient (t-statistic)	Coefficient (t-statistic)
C	13.098 (0.54)	14.192** (2.57)	7.874*** (2.50)	0.205 (0.55)	16.244*** (3.88)
MALE	5.057 (0.71)	-2.855* (-1.79)	1.698* (1.86)	0.196 (1.54)	0.009 (0.01)
PE	-1.927 (-0.22)	-0.735 (-0.37)	2.858** (2.52)	0.171 (1.23)	-1.373 (-0.89)
EE	-2.416 (-0.38)	2.136 (1.52)	1.304* (1.66)	0.157* (1.78)	-0.730 (-0.67)
EA	1.335 (0.23)	-0.407 (-0.29)	0.277 (0.36)	-0.137 (-1.47)	1.029 (0.98)
PD	-12.84* (-1.72)	-4.514** (-2.56)	1.986** (1.98)	0.151 (1.22)	-1.075 (-0.78)
AGE	0.869*** (2.79)	-0.075 (-1.08)	0.055 (1.41)	-0.006 (-1.33)	-0.029 (-0.53)
GDPR	1.100* (1.89)	0.038 (0.25)	-0.037 (-0.42)	-0.012 (-1.41)	0.024 (0.22)
INF	0.184 (0.88)	-0.023 (-0.22)	0.060 (0.92)	0.001 (0.22)	-0.058 (1.51)
INT	-0.411 (-1.20)	0.170* (1.79)	-0.126** (-1.99)	0.014*** (2.73)	-0.058 (0.93)
R ²	84.99	64.87	65.91	48.61	74.06
Adjusted R ²	81.57	56.77	57.81	36.48	68.64
F-statistic	24.87	8.02	8.14	4.01	13.67
Fixed effect	Yes	Yes	Yes	Yes	Yes
Observations	206	204	199	200	221

The results in this table are estimated using fixed-effect regression. Country and period fixed effect were applied

***, **, * represent significance at 1%, 5%, 10%

Gender analysis

Direct gender effect

This section reports the regression results for the effect of gender on financial stability. Two binary variables were introduced into the model namely: the ‘MALE’ and ‘FEMALE’ binary variables. The ‘MALE’ binary variable takes the value ‘1’ if the central bank governor is male, and ‘0’ otherwise. The ‘FEMALE’ binary variable takes the value ‘1’ if the central bank governor is female, and ‘0’ otherwise.

The MALE coefficient is negative and significant in column 2 of Table 3 when the level of nonperforming loans (NPL) is the indicator of financial stability. The negative coefficient of the MALE variable suggests that NPLs are lower during tenure of a male central bank governor. This implies that the financial system is more stable during the tenure of a male central bank governor. This is contrary to our expectation that female chief executives are more risk averse and conservative than their male counterparts [46, 47]. Also, the MALE coefficient is positive and significant in column 3 of Table 3 when the level of regulatory capital ratio (CAR) is used as the indicator of financial stability. The positive coefficient of the MALE variable suggests that regulatory capital ratios are higher during tenure of a male central

bank governor. This implies that the financial system is well-capitalised and more stable during the tenure of a male central bank governor.

The FEMALE coefficient is positive and significant in column 2 of Table 4 when the level of nonperforming loans (NPL) is the indicator of financial stability. The positive coefficient of the FEMALE variable suggest that NPLs are higher during tenure of a female central bank governor. This implies that the financial system is less stable during the tenure of a female central bank governor. This is contrary to our expectation that female chief executives are more risk averse and conservative than their male counterparts [46, 47]. Also, the FEMALE coefficient is negative and significant in column 3 of Table 4 when the level of regulatory capital ratio (CAR) is the indicator of financial stability. The negative coefficient of the FEMALE variable suggests that regulatory capital ratios are lower during tenure of a female central bank governor. This implies that the financial system may be under-capitalised and less stable during the tenure of a female central bank governor.

Table 4 Effect of being a female governor on financial stability

	(1) LLC	(2) NPL	(3) CAR	(4) CRISIS	(5) RISK
	Coefficient (t-statistic)	Coefficient (t-statistic)	Coefficient (t-statistic)	Coefficient (t-statistic)	Coefficient (t-statistic)
C	18.156 (0.91)	14.192** (2.57)	7.874*** (2.50)	0.205 (0.55)	16.244*** (3.88)
FEMALE	-5.057 (-0.71)	2.855* (1.79)	-1.698* (-1.86)	-0.196 (-1.54)	0.009 (0.01)
PE	-1.927 (-0.22)	-0.735 (-0.37)	2.858** (2.52)	0.171 (1.23)	-1.373 (-0.89)
EE	-2.416 (-0.38)	2.136 (1.52)	1.304* (1.66)	0.157* (1.78)	-0.730 (-0.67)
EA	1.335 (0.23)	-0.407 (-0.29)	0.277 (0.36)	-0.137 (-1.47)	1.029 (0.98)
PD	-12.84* (-1.72)	-4.514** (-2.56)	1.986** (1.98)	0.151 (1.22)	-1.075 (-0.78)
AGE	0.869*** (2.79)	-0.075 (-1.08)	0.055 (1.41)	-0.006 (-1.33)	-0.029 (-0.53)
GDPR	1.100* (1.89)	0.038 (0.25)	-0.037 (-0.42)	-0.012 (-1.41)	0.024 (0.22)
INF	0.184 (0.88)	-0.023 (-0.22)	0.060 (0.92)	0.001 (0.22)	-0.058 (1.51)
INT	-0.411 (-1.20)	0.170* (1.79)	-0.126** (-1.99)	0.014*** (2.73)	-0.058 (0.93)
R ²	84.99	64.87	65.91	48.61	74.06
Adjusted R ²	81.57	56.77	57.81	36.48	68.64
F-statistic	24.87	8.02	8.14	4.01	13.67
Fixed effect	Yes	Yes	Yes	Yes	Yes
Observations	206	204	199	200	221

The results in this table are estimated using fixed-effect regression. Country and period fixed effect were applied

***, **, * represent significance at 1%, 5%, 10%

Combined effect of gender and cognitive ability

The EE*FEMALE coefficient is positive and significant in column 2 and 6 of Table 5 when the level of loan loss coverage (LLC) and regulatory capital ratios (CAR) are the indicators of financial stability. The positive coefficient of the EE*FEMALE variable suggests that the financial system has higher loan loss coverage and high regulatory capital levels and is therefore stable, during the tenure of a female central bank governor that has high cognitive abilities. This implies that the financial system is more stable during the tenure of a female central bank governor that has high cognitive abilities. Also, the EE*FEMALE coefficient is negative and significant in column 4 of Table 5 when the level of nonperforming loans (NPL) is the indicator of financial stability. The negative coefficient of the EE*FEMALE variable suggests that the financial system has fewer nonperforming loans and is therefore stable, during the tenure of a female central bank governor that has high cognitive abilities.

Also, the EE*MALE coefficient is negative and significant in column 1 and 5 of Table 5 when the level of loan loss coverage (LLC) and regulatory capital ratios (CAR) are the indicators of financial stability. The negative coefficient of the EE*MALE variable suggests that the financial system has fewer loan loss coverage and low regulatory capital levels and is therefore unstable, during the tenure of a male central bank governor that has high

cognitive abilities. This implies that the financial system is less stable during the tenure of a male central bank governor that has high cognitive abilities. However, the EE*MALE coefficient is positive and significant in column 3 of Table 5 when the level of nonperforming loans (NPL) is the indicator of financial stability. The positive coefficient of the EE*MALE variable suggests that the financial system has higher nonperforming loans and is therefore unstable, during the tenure of a male central bank governor that has high cognitive abilities.

Combined effect of gender and social capital

The EA*FEMALE coefficient is positive and significant in column 2 and 6 of Table 6 when the level of loan loss coverage (LLC) and regulatory capital ratios (CAR) are the indicators of financial stability. The positive coefficient of the EA*FEMALE variable suggests that the financial system has higher loan loss coverage and high regulatory capital levels and is therefore stable, during the tenure of a female central bank governor that has high social capital or strong social ties. This implies that the financial system is more stable during the tenure of a female central bank governor that has high social capital or strong social ties. However, the EA*FEMALE coefficient is not significant when the level of nonperforming loans (NPL) is the indicator of financial stability in column 4.

Table 5 Effect of governor's gender and cognitive ability on financial stability

	LLC			NPL			CAR			CRISIS		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)				
	Coefficient (t-statistic)	Coefficient (t-statistic)	Coefficient (t-statistic)	Coefficient (t-statistic)	Coefficient (t-statistic)	Coefficient (t-statistic)	Coefficient (t-statistic)	Coefficient (t-statistic)				
C	- 8.860 (-0.36)	12.214 (0.63)	18.295*** (3.18)	12.935*** (2.82)	5.686* (1.73)	8.711*** (3.34)	0.252 (0.63)	0.419 (1.42)				
MALE	21.074*** (2.63)		- 5.359*** (- 2.79)		3.025*** (2.74)		0.168 (1.12)					
EE*MALE	- 50.885*** (- 3.87)		6.635** (2.28)		- 3.449** (- 2.08)		0.076 (0.35)					
FEMALE		- 21.074*** (- 2.63)		5.359*** (2.79)		- 3.025*** (- 2.74)		- 0.168 (- 1.12)				
EE*FEMALE		50.885*** (3.88)		- 6.635*** (- 2.28)		3.449** (2.08)		- 0.076 (- 0.35)				
PE	5.105 (0.59)	5.105 (0.59)	- 1.929 (- 0.95)	- 1.929 (- 0.95)	3.499*** (3.01)	3.499*** (3.01)	0.157 (1.08)	0.157 (1.08)				
EE	43.615*** (3.25)	- 7.269 (- 1.15)	- 4.083 (- 1.33)	2.552* (1.82)	4.513*** (2.62)	1.064 (1.35)	0.085 (0.37)	0.161* (1.79)				
EA	- 4.375 (- 0.76)	- 4.375 (- 0.76)	0.295 (0.21)	0.295 (0.21)	- 0.076 (- 0.09)	- 0.076 (- 0.09)	- 0.129 (- 1.34)	- 0.129 (- 1.34)				
PD	- 7.884 (- 1.08)	- 7.884 (- 1.08)	- 5.166*** (- 2.93)	- 5.166*** (- 2.93)	2.349** (2.33)	2.349** (2.33)	0.142 (1.11)	0.142 (1.11)				
AGE	0.951*** (3.18)	0.951*** (3.18)	- 0.097 (- 1.39)	- 0.097 (- 1.39)	0.067* (1.72)	0.067* (1.72)	- 0.006 (- 1.36)	- 0.006 (- 1.36)				
GDP	1.094* (1.96)	1.094* (1.96)	0.051 (0.34)	0.051 (0.34)	- 0.047 (- 0.53)	- 0.047 (- 0.53)	- 0.012 (- 1.39)	- 0.012 (- 1.39)				
INF	0.128 (0.64)	0.128 (0.64)	0.003 (0.03)	0.003 (0.03)	0.046 (0.72)	0.046 (0.72)	0.001 (0.24)	0.001 (0.24)				
INT	- 0.215 (- 0.64)	- 0.215 (- 0.65)	0.141 (1.48)	0.141 (1.48)	- 0.108* (- 1.69)	- 0.108* (- 1.69)	0.014*** (2.65)	0.014*** (2.65)				
R ²	86.24	86.24	65.95	65.95	66.81	66.81	48.65	48.65				
Adjusted R ²	83.00	83.00	57.85	57.85	58.67	58.67	36.13	36.13				
F-statistic	26.67	26.67	8.14	8.14	8.21	8.21	3.89	3.89				
Fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes				
Observations	206	206	204	204	199	199	200	200				

The results in this table are estimated using fixed-effect regression. Country and period fixed effect were applied

***, **, * represent significance at 1%, 5%, 10%

Table 6 Effect of governor's gender and social capital on financial stability

	LLC		NPL			CAR			CRISIS		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)			
	Coefficient (t-statistic)	Coefficient (t-statistic)	Coefficient (t-statistic)	Coefficient (t-statistic)	Coefficient (t-statistic)	Coefficient (t-statistic)	Coefficient (t-statistic)	Coefficient (t-statistic)			
C	-11.719 (-0.44)	8.255 (0.41)	17.833*** (2.97)	12.725*** (2.73)	5.699* (1.67)	8.747*** (3.32)	0.015 (0.03)	0.419 (1.42)			
MALE	19.975** (2.02)		-5.108** (-2.36)		3.047** (2.48)		0.299 (1.45)				
EA*MALE	-26.348** (-2.17)	-19.975 (-2.02)	4.392 (1.54)	5.108** (2.36)	-2.643* (-1.64)	-3.047*** (-2.48)	-0.142 (-0.64)	-0.299 (-1.45)			
FEMALE		26.348*** (2.17)		-4.391 (-1.54)		2.643* (1.64)		0.142 (0.64)			
EA*FEMALE		0.297 (0.03)	-0.906 (-0.46)	-0.906 (-0.46)	2.931** (2.59)	2.931** (2.59)	0.195 (1.35)	0.195 (1.35)			
PE	0.297 (0.03)	1.648 (0.25)	1.318 (0.88)	1.318 (0.88)	1.771** (2.13)	1.771** (2.13)	0.189* (1.86)	0.189* (1.86)			
EE	1.648 (0.25)	21.220* (1.96)	-3.831 (-1.47)	0.561 (0.37)	2.374 (1.59)	-0.268 (-0.323)	-0.037 (-0.21)	-0.179 (-1.57)			
EA	21.220* (1.96)	-11.375 (-1.54)	-4.642*** (-2.64)	-4.642*** (-2.64)	2.084** (2.08)	2.084** (2.08)	0.163 (1.29)	0.163 (1.29)			
PD	-11.375 (-1.54)	1.035*** (3.27)	-0.100 (-1.41)	-0.100 (-1.41)	0.071* (1.75)	0.071* (1.75)	-0.004 (-0.89)	-0.004 (-0.89)			
AGE	1.035*** (3.27)	1.130* (1.96)	0.035 (0.24)	0.035 (0.24)	-0.034 (-0.39)	-0.034 (-0.39)	-0.011 (-1.36)	-0.011 (-1.36)			
GDPR	1.130* (1.96)	0.099 (0.48)	0.012 (0.12)	0.012 (0.12)	0.038 (0.56)	0.038 (0.56)	0.0001 (0.03)	0.0001 (0.03)			
INF	0.099 (0.48)	-0.291 (-0.85)	0.148 (1.55)	0.148 (1.55)	-0.112* (-1.75)	-0.112* (-1.75)	0.014*** (2.78)	0.014*** (2.78)			
INT	-0.291 (-0.85)	86.24	65.37	65.95	66.47	66.47	48.65	48.65			
R ²	85.40	83.00	57.13	57.85	58.25	58.25	36.13	36.13			
Adjusted R ²	81.97	26.67	7.94	8.14	8.08	8.08	3.89	3.89			
F-statistic	24.89	Yes	Yes	Yes	Yes	Yes	Yes	Yes			
Fixed effect	Yes	206	204	204	199	199	200	200			
Observations	206										

The results in this table are estimated using fixed-effect regression. Country and period fixed effect were applied

***, **, * represent significance at 1%, 5%, 10%

Also, the EA*MALE coefficient is negative and significant in column 1 and 5 of Table 6 when the level of loan loss coverage (LLC) and regulatory capital ratios (CAR) are the indicators of financial stability. The negative coefficient of the EA*MALE variable suggests that the financial system has fewer loan loss coverage and low regulatory capital levels and is therefore unstable, during the tenure of a male central bank governor that has high social capital or strong social ties. This implies that the financial system is less stable during the tenure of a male central bank governor that has high social capital or strong social ties. However, the EA*MALE coefficient is not significant when the level of nonperforming loans (NPL) is the indicator of financial stability in column 3.

Discussion on male dominance in central bank leadership

The findings in ‘Direct gender effect’ section suggest that regulatory capital ratios are higher during tenure of a male central bank governor than a female central bank governor, which implies that the financial system is well-capitalised and, therefore, more stable during the tenure of a male central bank governor. We are aware that this result may seem questionable at first and may evoke unpleasant reactions from gender

equality advocates who may interpret this to mean that men are better at being central bank governors than women. Such interpretation, although confirmed by the data used for this study, does not necessarily mean that financial crises are more frequent during the tenure of female central bank governors. No! Rather the result points to the strong gender bias that favour male appointees in the political system of many countries which also influence the selection of a male or female central bank governors. Although some developing and transition countries in our sample have the central bank governor position being dominated by men and old economists, we also observed that women have recently begin to occupy the central bank governor positions in more advanced economies, and the number of female governors is expected to increase in the near future.

Further analyses

Combined effect of cognitive ability, social capital and technical competence

This section tests the combined effect of cognitive ability, social capital and technical competence on financial stability. The PE*EA*EE coefficient is positive when LLC

Table 7 Effect of knowledge (PE), cognitive ability (EE) and social capital (EA) on financial stability (SB)

	LLC (1)	NPL (2)	CAR (3)	CRISIS (4)	RISK (5)
	Coefficient (t-statistic)	Coefficient (t-statistic)	Coefficient (t-statistic)	Coefficient (t-statistic)	Coefficient (t-statistic)
C	66.326*** (3.83)	8.255 (0.41)	11.568*** (4.56)	0.434* (1.63)	4.405*** (0.00)
PE*EA	- 19.697 (- 1.42)	1.165 (0.36)	- 2.138* (- 1.88)	0.009 (0.05)	- 0.158 (- 0.06)
PE*EE	- 72.474*** (- 5.66)	7.577** (2.37)	0.225 (0.12)	0.522** (2.49)	3.712 (1.46)
PE*EA*EE	82.212*** (5.59)	- 6.347* (- 1.73)	1.506 (0.71)	- 0.395* (- 1.67)	- 1.830 (- 0.63)
PE	- 0.809 (- 0.09)	0.372 (0.17)	2.374* (1.88)	0.005 (0.04)	1.794 (1.09)
EE	5.064 (0.69)	0.954 (0.52)	0.585 (0.55)	0.007 (0.05)	- 1.917 (- 1.35)
EA	0.940 (0.17)	- 1.141 (- 0.79)	1.064 (1.30)	- 0.056 (- 0.60)	1.048 (0.94)
PD	- 8.189 (- 1.20)	- 4.231** (- 2.45)	1.672* (1.68)	0.051 (0.42)	- 1.305 (- 0.96)
AGE	0.034 (0.12)	0.051 (0.77)	0.022 (0.57)	- 0.006 (- 1.44)	0.002 (0.03)
GDP	0.802* (1.53)	0.073 (0.49)	- 0.041 (- 0.46)	- 0.013 (- 1.49)	0.035 (0.32)
INF	0.166 (0.87)	- 0.046 (- 0.43)	0.076 (1.11)	0.002 (0.58)	- 0.059 (- 1.49)
INT	- 0.376 (- 1.22)	0.141 (1.47)	- 0.123* (- 1.91)	0.013** (2.52)	- 0.068 (- 1.07)
R ²	88.01	86.24	65.46	49.92	74.42
Adjusted R ²	85.10	57.11	56.72	37.32	68.73
F-statistic	30.27	7.75	7.48	3.96	13.09
Fixed effect	Yes	Yes	Yes	Yes	Yes
Observations	206	204	199	200	221

The results in this table are estimated using fixed-effect regression. Country and period fixed effect were applied

***, **, * represent significance at 1%, 5%, 10%

is the dependent variable in column 1 of Table 7. This suggest that the financial system is stable during the tenure of a central bank governor that has high cognitive ability, technical competence and social competence, combined. Similarly, the PE*EA*EE coefficient is negative when NPL is the dependent variable in column 2. This suggests that the financial system is stable during the tenure of a central bank governor that has high cognitive ability, technical competence and social competence, combined.

Comparing developed and developing countries

Here, the sample is divided into two categories: ‘developed countries’ and ‘developing and transition countries’. The DV binary variable was introduced to represent developed countries while the DN binary variable was introduced to represent developing and transition countries. The DV variable takes the value ‘1’ if the country is a developed country and ‘0’ otherwise. The DN variable takes the value ‘1’ if the country is a developing country and ‘0’ otherwise. The DV and DN binary variables are then interacted with the competence variables to determine their effects on financial stability. The results are reported in Table 8.

For the developed countries category, the DV*PE, DV*EE and DV*EA coefficients are positive and significant in column 1 when LLC is the indicator of financial stability, which indicates that the financial system of developed countries is more stable during the tenure of a central bank governor that has good cognitive ability, social capital and technical competence in economics. Also, the DV*EE coefficient is positive and significant when ‘CRISIS’ and ‘RISK’ variables are used as indicators of financial stability, which indicates that the financial system of developed countries is more stable during the tenure of a central bank governor that has good cognitive ability. On the other hand, the DV*PD coefficient is positive and significant in column 2 when NPL is the indicator of financial stability, indicating that the financial system of developed countries has high NPLs during the tenure of a central bank governor that has knowledge in disciplines other than economics.

For the developing countries category, the DN*PE, DN*EE and DN*EA coefficients are negative and significant in column 1 when LLC is the indicator of financial stability, which indicates that the financial system of developing countries is less stable during the

Table 8 Effect of competence on financial stability in developed countries

	(1) LLC	(2) NPL	(3) CAR	(4) CRISIS	(5) RISK
	Coefficient (t-statistic)	Coefficient (t-statistic)	Coefficient (t-statistic)	Coefficient (t-statistic)	Coefficient (t-statistic)
C	65.395*** (2.67)	14.799*** (3.54)	20.654*** (8.89)	0.229 (1.19)	5.636 (1.54)
DV	-28.871 (-1.38)	-12.428*** (-3.97)	1.097 (0.62)	-0.091 (-0.62)	0.007 (0.003)
DV*PE	76.243*** (4.13)	3.810 (1.28)	-1.110 (-0.66)	0.012 (0.09)	6.266** (2.31)
DV*EE	79.961*** (4.13)	4.347 (1.60)	0.292 (0.19)	0.459*** (3.52)	6.349*** (2.60)
DV*EA	40.523*** (2.61)	2.775 (1.08)	-1.958 (-1.36)	-0.299** (-2.28)	-9.423*** (-4.11)
DV*PD	-28.800 (-1.36)	7.062** (2.18)	-2.792 (-1.52)	-0.069 (-0.45)	1.487 (0.51)
PE	-32.129*** (-2.75)	-2.407 (-1.18)	1.060 (0.93)	0.115 (1.18)	4.905*** (2.66)
EE	48.295*** (5.83)	0.649 (0.44)	-0.882 (-1.06)	0.066 (0.96)	-4.771*** (-3.64)
EA	48.295*** (5.83)	-3.035** (-2.35)	1.859*** (2.49)	-0.188*** (-3.35)	1.299 (1.19)
PD	-9.813 (-0.84)	-2.775 (-1.36)	0.402 (0.35)	0.115 (1.17)	1.869 (1.01)
AGE	0.776* (1.92)	-0.077 (-1.17)	-0.115*** (-3.18)	-0.002 (-0.76)	0.061 (1.05)
GDPR	-0.330 (-0.37)	0.121 (0.73)	-0.115 (-1.17)	-0.014* (-1.96)	0.359*** (2.59)
INF	-0.758** (-2.24)	0.038 (0.39)	0.109* (1.86)	0.002 (0.84)	-0.091* (-1.71)
INT	-1.969 (-3.52)	0.189* (1.72)	-0.181** (-2.70)	0.012*** (2.64)	-0.017 (-0.19)
R ²	45.04	31.55	34.84	42.77	33.67
Adjusted R ²	35.98	20.14	23.66	33.01	23.60
F-statistic	4.973	2.76	3.11	4.38	3.34
Fixed effect	Yes	Yes	Yes	Yes	Yes
Observations	206	204	199	200	221

The results in this table are estimated using fixed-effect regression. Only period fixed effect was applied

***, **, * represent significance at 1%, 5%, 10%

tenure of a central bank governor that has good cognitive ability, social capital and technical competence in economics. Also, the DN*EE coefficient is negative and significant when 'CRISIS' and 'RISK' variables are used as indicators of financial stability, which indicates that the financial system of developing countries is less stable during the tenure of a central bank governor that has good cognitive ability. On the other hand, the DN*PD coefficient is negative and significant in column 2 when NPL is the indicator of financial stability, indicating that the financial system of developing countries has fewer NPLs during the tenure of a central bank governor that has knowledge in disciplines other than economics (see Table 9 below).

Conclusion

This study examined whether the competence of a central bank governor affects financial system stability. The findings reveal that the financial system is more stable when the central bank governor is older and male. The findings also reveal that the financial system is stable during the tenure of a central bank governor that has a combination of cognitive ability, social capital and technical competence in economics. The findings from the gender analyses reveal that the financial system is more stable when the central bank

governor is male. However, further analyses reveal that the financial system is also stable during the tenure of a female central bank governor that has strong social capital or high cognitive abilities while the financial system is relatively less stable during the tenure of a male central bank governor that has strong social capital or high cognitive abilities.

Comparing developed countries to developing and transition countries, the findings reveal that the financial system of developed countries is more stable during the tenure of a central bank governor that has good cognitive ability, social capital and technical competence in economics while the financial system of developing and transition countries is less stable during the tenure of a central bank governor that has good cognitive ability, social capital and technical competence in economics. Also, there is evidence that the financial system of developing and transition countries is more stable during the tenure of a central bank governor that has knowledge in disciplines other than economics. The implication of the findings is that the competence of central bank governors matters for financial stability but this depends on how the central bank governor's competence is measured.

Moreover, the dynamics of competence and financial stability may be influenced by complex socioeconomic

Table 9 Effect of competence on financial stability in developing countries

	(1) LLC	(2) NPL	(3) CAR	(4) CRISIS	(5) RISK
	Coefficient (t-statistic)	Coefficient (t-statistic)	Coefficient (t-statistic)	Coefficient (t-statistic)	Coefficient (t-statistic)
C	36.524 (1.13)	2.371 (0.48)	21.752*** (8.08)	0.139 (0.62)	5.644 (1.30)
DN	28.871 (1.38)	12.428*** (-3.97)	-1.097 (-0.62)	0.091 (0.62)	-0.007 (-0.003)
DN*PE	-76.243*** (-4.13)	-3.810 (-1.28)	1.110 (0.66)	-0.012 (-0.09)	-6.266** (-2.31)
DN*EE	79.961*** (4.47)	-4.347 (-1.60)	0.292 (0.19)	-0.459*** (-3.52)	-6.349*** (-2.60)
DN*EA	-40.523*** (-2.61)	-2.775 (-1.08)	1.958 (1.36)	0.299** (2.28)	9.423*** (4.11)
DN*PD	28.800 (1.36)	-7.062** (-2.18)	2.792 (1.52)	-0.069 (-0.45)	-1.487 (-0.51)
PE	44.114*** (3.11)	1.403 (0.64)	-0.050 (-0.04)	0.128 (1.19)	11.171*** (5.64)
EE	-31.666** (-2.01)	4.996** (2.21)	-0.591 (-0.47)	0.525*** (4.77)	1.578 (0.77)
EA	-8.586 (-0.62)	-0.259 (-0.12)	-0.099 (-0.08)	-0.488*** (-4.16)	-8.124*** (-4.02)
PD	-38.614** (-2.17)	4.286* (1.72)	-2.389* (-1.71)	0.045 (0.39)	3.357 (1.48)
AGE	0.776* (1.92)	-0.077 (-1.17)	-0.115*** (-3.18)	-0.002 (-0.76)	0.061 (1.05)
GDPR	-0.330 (-0.37)	0.121 (0.73)	-0.115 (-1.17)	-0.014* (-1.96)	0.359*** (2.59)
INF	-0.758** (-2.24)	0.038 (0.39)	0.109* (1.86)	0.002 (0.84)	-0.091* (-1.71)
INT	-1.969 (-3.52)	0.189* (1.72)	-0.181** (-2.70)	0.012*** (2.64)	-0.017 (-0.19)
R ²	45.04	31.55	34.84	42.77	33.67
Adjusted R ²	35.98	20.14	23.66	33.01	23.60
F-statistic	4.973	2.76	3.11	4.38	3.34
Fixed effect	Yes	Yes	Yes	Yes	Yes
Observations	206	204	199	200	221

The results in this table are estimated using fixed-effect regression. Only period fixed effect was applied

***, **, * represent significance at 1%, 5%, 10%

mechanisms that differ from country to country. The competence of central bank governors may be affected by families’ social background, occupation, income and wealth of the central bank governor, while stability in the financial system may be influenced by high corruption, weak supervisory processes, high political interference in financial regulation and regulatory arbitrage in the financial system. These complex socioeconomic factors may alter the relationship between competence and financial stability.

Future research can examine how complex socioeconomic factors influence the relationship between central bank governors’ competence and financial stability. Future research studies can also examine the influence of other personality traits that could potentially influence the stability of the banking sector. Some personality traits can make the central bank governor exercise excessive caution in financial stability decision-making than others. Finally, the limitation of the study relates to the choice of competence indicators and the choice of countries. Firstly, our measures of competence may be too narrow and may not capture

other broad dimensions of competence. Secondly, there is the possibility that some relevant competence variables are omitted. Thirdly, the choice of countries could be expanded to include more countries that have had a female central bank governor.

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Appendix: Sample descriptive statistics

See Tables 10 and 11.

Table 10 Descriptive statistics

	RISK	NPL	LLC	CAR	CRISIS	PE	EE	EA	MALE	FEMALE	AGE	PD
Mean	13.32	6.237	62.95	14.92	0.149	0.482	0.309	0.456	0.787	0.213	55	0.419
Median	13.23	3.656	51.10	14.50	0.000	0.000	0.000	0.000	1.000	0.000	56	0.000
Maximum	38.48	37.30	176.90	31.10	1.000	1.000	1.000	1.000	1.000	1.000	79	1.000
Minimum	0.46	0.40	7.52	1.75	0.000	0.000	0.000	0.000	0.000	0.000	36	0.000
SD	6.04	6.42	41.86	3.75	0.357	0.501	0.463	0.357	0.410	0.410	8	0.494
Skewness	0.58	1.83	0.68	0.77	1.96	0.073	0.827	0.177	-1.400	1.400	0.09	0.328
Observations	272	272	272	272	272	272	272	272	272	272	272	272

LLC = loan loss coverage ratio (%); CRISIS = banking crisis dummy variable (1 = banking crisis, 0 = none); RISK = Bank z-score; NPL = bank nonperforming loans to gross loans ratio (%); CAR = bank regulatory capital to risk-weighted assets ratio (%); PE = Competence in macroeconomic management; EE = educated in a global elite university or institution; EA = educated in a foreign university or institution; AGE = the age of the central bank governor; MALE = a binary variable that take the value 1 if the head regulator is male, and zero if female; FEMALE = a binary variable that take the value 1 if the head regulator is female, and zero is male. PD = having knowledge in disciplines other than economics

Table 11 Description of variables

Variable	Indicator name	Long definition	Source
LLC	Provisions to nonperforming loans (%)	Provisions to nonperforming loans ratio.	Financial Soundness Indicators Database (fsi.imf.org), International Monetary Fund (IMF)
CRISIS	Banking crisis dummy (1 = banking crisis, 0 = none)	A banking crisis is defined as systemic if two conditions are met: a. Significant signs of financial distress in the banking system (as indicated by significant bank runs, losses in the banking system, and/or bank liquidations), b. Significant banking policy intervention measures in response to significant losses in the banking system.	Laeven, L. and Valencia, F. (2013), 'Systemic Banking Crises Database: An Update', IMF WP/12/163
RISK	Bank Z-score	It captures the probability of default of a country's banking system. Z-score compares the buffer of a country's banking system (capitalisation and returns) with the volatility of those returns.	Bankscope, Bureau van Dijk (BvD)
NPL	Bank nonperforming loans to gross loans (%)	Nonperforming loans to gross loans ratio	Financial Soundness Indicators Database (fsi.imf.org), International Monetary Fund (IMF)
CAR	Bank regulatory capital to risk-weighted assets (%)	The ratio of bank regulatory capital to risk-weighted assets	Financial Soundness Indicators Database (fsi.imf.org), International Monetary Fund (IMF)
PE	PE	Public sources mainly: the official Wikipedia page of the governor, online CV or resume of central bank governor, and from central bank websites.	Public sources mainly: the official Wikipedia page of the governor, online CV or resume of central bank governor, and from central bank websites.
EE	EE	Obtained highest degree from an elite university or institution	Public sources mainly: the official Wikipedia page of the governor, online CV or resume of central bank governor, and from central bank websites
EA	EA	Obtained foreign education	Public sources mainly: the official Wikipedia page of the governor, online CV or resume of central bank governor, and from central bank websites
AGE	AGE	Age of the central bank governor, and from central bank websites	Publicly available information
MALE	Gender: Male	Gender of the central bank governor, and from central bank websites	Publicly available information
FEMALE	Gender: Female (FW)	Gender of the central bank governor, and from central bank websites	Publicly available information

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