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Overview

The ***Journal of Banking and Financial Economics*** **(JBFE)** is an open access journal. The submission of manuscripts in free of fee payment. This journal follows a double-blind reviewing procedure.

Aims and Scope

JBFE publishes high quality empirical and theoretical papers spanning all the major research fields in banking and financial economics. The aim of the journal is to provide an outlet for the increasing flow of scholarly research concerning banking, financial institutions and the money and capital markets within which they function. The journal also focuses on interrelations of financial variables, such as prices, interest rates and shares and concentrates on influences of real economic variables on financial ones and vice versa. Macro-financial policy issues, including comparative financial systems, the globalization of financial services, and the impact of these phenomena on economic growth and financial stability, are also within the *JBFE*'s scope of interest. The Journal seeks to promote research that enriches the profession's understanding of the above mentioned as well as to promote the formulation of sound public policies.

Main subjects covered include, e.g.: [1] ***Valuation of assets***: Accounting and financial reporting; Asset pricing; Stochastic models for asset and instrument prices; [2] ***Financial markets and instruments:*** Alternative investments; Commodity and energy markets; Derivatives, stocks and bonds markets; Money markets and instruments; Currency markets; [3] ***Financial institutions, services and regulation***: Banking efficiency; Banking regulation; Bank solvency and capital structure; Credit rating and scoring; Regulation of financial markets and institutions; Systemic risk; [4] ***Corporate finance and governance****:* Behavioral finance; Empirical finance; Financial applications of decision theory or game theory; Financial applications of simulation or numerical methods; Financial forecasting; Financial risk management and analysis; Portfolio optimization and trading.

Special Issues

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Proposals of Special Issues should be submitted to at jbfe@wz.uw.edu.pl. All proposals are being reviewed by the Editorial Team on the basis of certain criteria that include e.g.: the novelty, importance and topicality of the theme; whether the papers will form an integrated whole; and the overall 'added value' of a Special Issue.

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Supervisory Technology As a New Tool for Banking Sector Supervision

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ABSTRACT

After last global financial crisis from a decade ago, financial market have been experiencing significant increase in number of regulations. This was especially visible in the banking sector, in which number of post-crisis new regulations amounted to thousands per year. It was not only challenging for banks, that have been spending increasingly more financial resources on compliance, but also for supervisory entities that have to keep track of compliance for every entity on financial market. Due to the fact that supervisory process relies mostly on manual process, it can be both time consuming and inefficient. This is why, not only banks have been exploring new technologies in compliance with regulations (Reg Tech), but also supervisory authorities have been doing the same with the aim of increasing their efficiency (Sup Tech). The research paper aims to test hypothesis, which is as follows:

– Sup Tech is becoming an innovative tool for banking supervision and is expected to have increasingly larger role in banking supervision

For the purpose of the paper, the following methods have been applied: critical analysis of literature and research papers as well as descriptive method and comparative analysis of presented data.

JEL Classification: E42, G21, O14

Keywords: Supervisory Technology, Supervisory Authority, Sup Tech.

1. INTRODUCTION

During COVID-19 pandemic, companies in every business sector globally have been doing their best efforts to adapt their operations to current business environment. Among most significant changes there are restricted travels, inability to work from office as well as transition to digital from personal. For banking sector, the most important disruption is rapid digital transition. Although it has been undergoing globally for several years, COVID-19 pandemic greatly decreased amount of time during which, banks could have prepared for this transition. Not only do banks have less time to implement technological improvements, but also their financial resources and operating revenues are limited in low interest rates environment and significant spending on compliance. However, the need for digital technologies is present both parties of supervisory process in the banking sector - banks and supervisory entities. Potential synergies from using same technologies could be beneficial for both, hence reducing cost and time of the supervision.

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2. RESEARCH METHODOLOGY, PROCESS AND HYPOTHESIS

The research paper aims to test hypothesis, which is as follows:

– Sup Tech is becoming an innovative tool for banking supervision and is expected to have increasingly larger role in banking supervision

The aim of the article is to present Supervisory Technology (Sup Tech) and depict successful implementation of Sup Tech solutions worldwide.

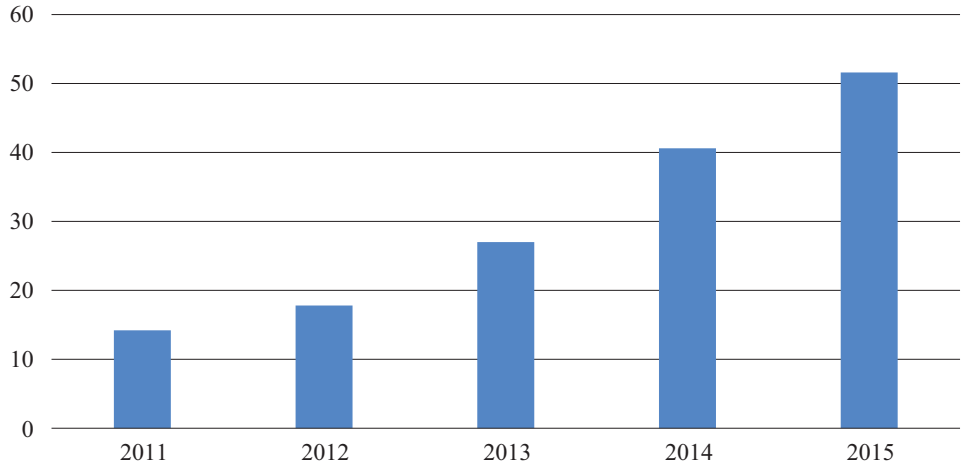
For the purpose of the paper, the following methods have been applied: critical analysis of literature and research papers as well as descriptive method and comparative analysis of presented data. Content analysis was aimed at providing outlook of regulatory trends in global banking sector. Then, Sup Tech definition was provided and key areas of use were presented. Furthermore, Sup Tech cases of implementation with assessment were depicted. Lastly, future outlook on the issue in question and conclusions regarding hypothesis were proposed.

3. REGULATORY OUTLOOK FOR GLOBAL BANKING SECTOR

After global financial crisis in 2007–2009 and several government interventions to rescue largest systemically important banks, numerous new regulations have been implemented in the global financial market, especially in the banking sector (Zaleska M., 2020). Number of new regulations globally for the banking sector is depicted on chart 1. The analysis is dated from 2011 to 2015 due to both rapid increase of the number of regulations and data availability,

Chart 1

New regulatory changes for the banking sector by year 2011–2015 (‘000)



Source: Global Risk 2017: Staying the course in banking, Boston Consulting Group, 2017.

Global regulatory changes between 2011 and 2015 more than tripled, increasing from ~14200 to ~51600 per year. With this large number of new regulations for the banking sector and little time to ensure full compliance with them, banks were imposed with heavy penalties regarding noncompliance. Despite decreasing, they have been significant for banks financial statements (Boston Consulting Group, 2017). Total noncompliance penalties paid by banks globally are depicted on chart 2.

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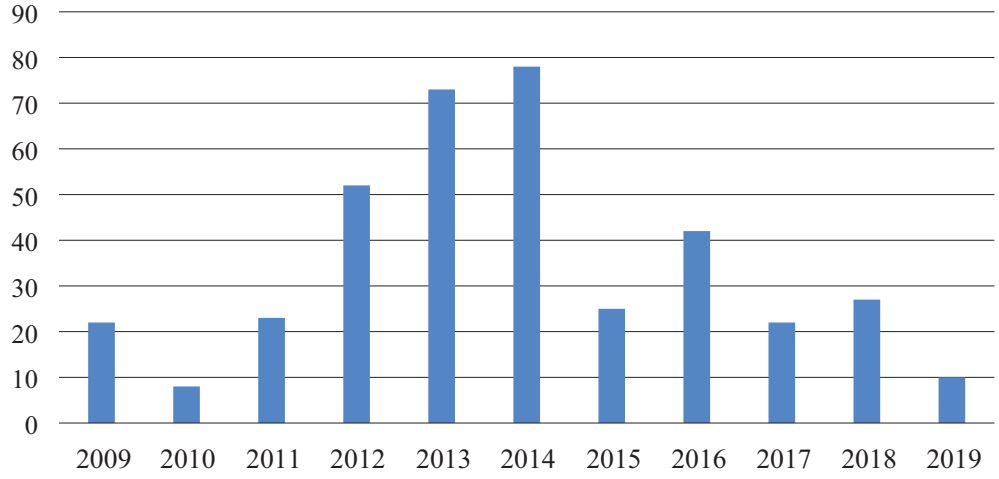
Chart 2
Noncompliance penalties paid by banks globally 2009–2019 ($B)



Source: Global Risk 2020: It's Time for Banks to Self-Disrupt, Boston Consulting Group, 2020.

Compliance continued to be a significant cost for banks. Banks are being forced to spend heavy financial resources for keeping up with latest regulations:

– the majority of banks (~75%) are spending ~20% of the overall budget for regulatory compliance (Compliance.ai, 2020),
– 60% of companies (with particular regard to banking) expect compliance budget increase (Reuters, 2020),
– total compliance cost is equal to ~40% of overall bank revenue,
– personnel constitutes for ~80% of total compliance cost (McKinsey, 2018),

Because of the fact that the majority of compliance cost is being spent on human component, Reg Tech market is expected to increase its' global value from $6.3B to $16.3B, while growing very rapidly at ~20% CAGR between 2020-2025 (Markets and Markets, 2019).

What is more, due to ongoing digital transformation in the industry, banks need to anticipate and manage any emerging challenges regarding for instance: cyber security, privacy protection, cloud transition or even impact from climate change (EY, 2019). Implementation of advanced digital banking services, like robo-advisory, has been increasing as well (Dziawgo T., 2018; Financial Stability Board, 2020).

What is more, over-regulation may lead to several negative macroeconomic effects. FRAME (online repository of studies on financial regulations effects) provides information on approximate impact of given regulation on several micro and macroeconomic variables. The analysis considers regulatory ratio, i.e. bank balance sheet ratio subjected to regulation. Based on data from 2019, it can be concluded, that increasing regulatory ratio by 1 p.p. can lead to moderate GDP decrease of 0.1 p.p. and significant investments decrease by 2.5 p.p. It does not have much impact on banking metrics, since: bank funding cost (decrease of 0.1 p.p.), bank lending rate (increase of 0.1 p.p) and bank liquidity growth rate (decrease of 0.1p.p.) have similar levels (Band for International Settlements, 2019).

COVID-19 also had significant impact on the financial situation of the banking sector, when total combined market capitalization for top 25 banks worldwide dropped from USD ~3.5 trillion to USD 2.71 trillion (GlobalData, 2019). Banks however need to take into account both global and national regulations, while performing business operations (Koleśnik J., 2018). If banks are to fail with compliance to such regulations, banks could take significant reputational damage (Niedziółka P., 2018; PwC, 2019; KPMG, 2019).

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However not only banks are looking for optimizing and managing regulatory processes internally through new technologies (Reg Tech). Supervisory authorities have been doing the same. Two of the key trends for regulations in financial market regard supervisory entities, which are: shifting from implementing new regulations to ongoing supervision by the authorities and shifting from supervising activities rather than entities (for example supervising payments than payment institutions) (Deloitte, 2019; European Securities and Markets Authority, 2018; Randall D., Lopes L., 2018).

Supervisory entities are also looking for new ways to use technological innovations in order to better respond to ongoing regulatory trends and increase efficiency of supervising both entities and activities (Sancak I., Zeranski S.,2020). Although concept of new technologies in supervision is not a new concept, numerous supervisory entities rely on non-automatic manual process (World Bank, 2018). Therefore, supervisors pursue similar technology as financial institutions to strengthen mutual cooperation and increase speed of sharing important data.

4. CLASSIFICATION OF SUP TECH AND ITS KEY AREAS OF USE

According to Bank for International Settlements, supervisory technology (Sup Tech) is: "Use of innovative technology by supervisory agency to support supervision" (Broeders D., Prenio J., 2018). Similar definition is presented by European Insurance and Occupational Pensions Authority, which states that: "Supervisory technology, that is defined as use of technology by supervisor to deliver innovative and efficient tech solutions, that will support (…) supervisory system" (European Insurance and Occupational Pensions Authority, 2020). It is important to differentiate Reg Tech, Sup Tech and Fin Tech. While Reg Tech is focused on assisting in compliance with law and regulations from companies perspective, Sup Tech is focused on helping, enhancing and facilitating supervisory process from supervisor perspective (World Bank, 2018). Fin Tech on the other hand is focused on financial services in general (Ślązak E., 2018).

Although Sup Tech is a relatively new term, it is expected to significantly develop in the next 10 years (KPMG, 2018). Key drivers for increased volume of Sup Tech solutions are as follows:

1) Unstructured data from financial entities – data received from financial companies is often qualitative and come from various sources, therefore aggregating information, identifying risks, giving recommendations and concluding insights is often time-consuming manual process.
2) Large complexity of received data – since final recommendations for financial company require professional judgment, increasing number regulations on the market, makes it more difficult for professionals to stay up to date with each guideline and provide appropriate recommendation.
3) New potential risks on financial market – dynamic migration of financial companies to virtual as well as numerous Fin Tech companies entry on the market, make supervisory process even more complex and technology more important to detect any new potential risks.
4) Limited manual resources in developing countries – several countries where financial regulations are not yet fully developed, could face issues concerning lack of qualified staff to undertake supervisory actions or heavy reliance on qualitative case to case supervision (World Bank, 2020).

Sup Tech core use is automating and digitizing supervisory procedures, while increasing their efficiency, availability of data to analyze and reducing costs (Toronto Centre Notes, 2018).

Sup Tech could be also used to following actions:

– real time access to company data and monitoring ongoing transactions,
– exchanging real time information across supervisory authorities,

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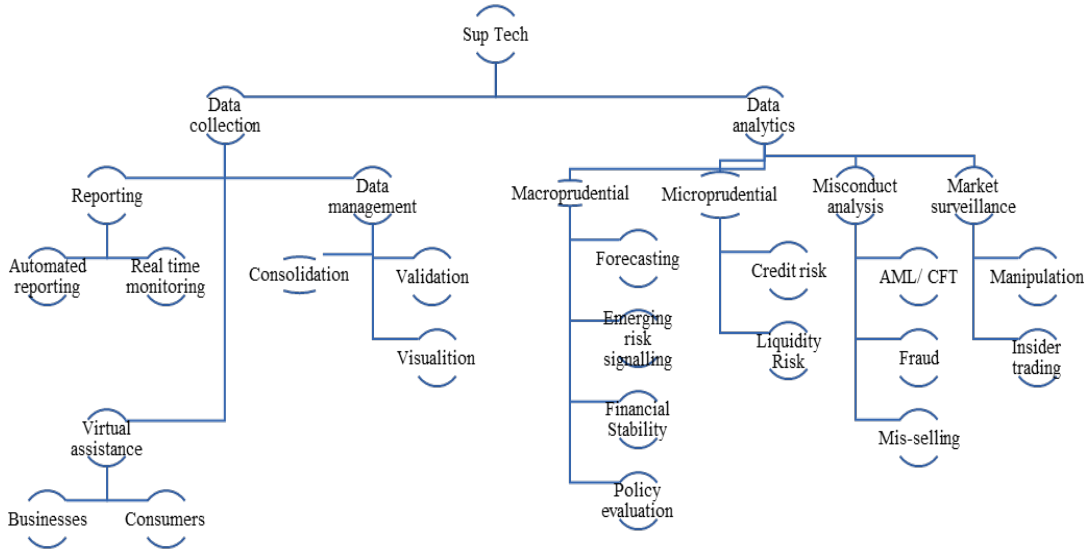
– undertaking preventive ex ante supervisory actions via predictive monitoring tools,
– using Artificial Intelligence (AI) to analyze Big Data in the company to detect any regulatory breaches, insider trading or market manipulation (KPMG, 2018).

Detailed use of Sup Tech application areas are depicted in Figure 1.

Figure 1
Sup Tech application areas of use



Source: Broeders D., Prenio J., Innovative technology in financial supervision (suptech) – the experience of early users, Bank for International Settlements, 2018.

Main areas of use for Sup Tech are data collection and data analytics. Data collection is further divided on: reporting, virtual assistance and data management, while data analytics in broken down on: macroprudential, microprudential, misconduct analysis and market surveillance.

Key technologies for reporting are: data push (development of special platform, on which banks can send data received directly by central bank), data pull (extracting necessary data directly from bank IT system by supervisor) and real-time monitoring (giving real-time alerts to supervisory entity in case of any abnormal situations). On the other hand, for data management key solutions are: automated data validation (checking whether data is complete and correct as well as improving data quality via machine learning), data consolidation (combining several data sources), data visualization (using visualization tools to present insights) and cloud computing (allowing for increased storage and capacity). For virtual assistance most important solutions are: chatbot usage (allowing online assistance to supervised bank) and machine- readable regulations (transforming regulation document into machine-readable format using natural language processing technology).

For market surveillance key technologies are applications analyzing vast amount of transactions, allowing for detecting insider trading and market manipulation. For misconduct analysis, Sup Tech solutions are focused on developing Neuro-Lingustic Programming (NLP) and Machine Learning (ML) algorithms to identify non-compliance with Anti-Money Laundering (AML) or Combating of Financing Terrorism (CFT) as well as detecting fraud and mis-selling. For microprudential supervision, main Sup Tech solutions are Machine Learning algorithms for credit-risk assessment and neural network to identify liquidity risk. Finally, key technologies for macroprudential supervision are NLP to measure client sentiment (ex. in social media) and applications designed to detect emerging risks (Broeders D., Prenio J., 2018).

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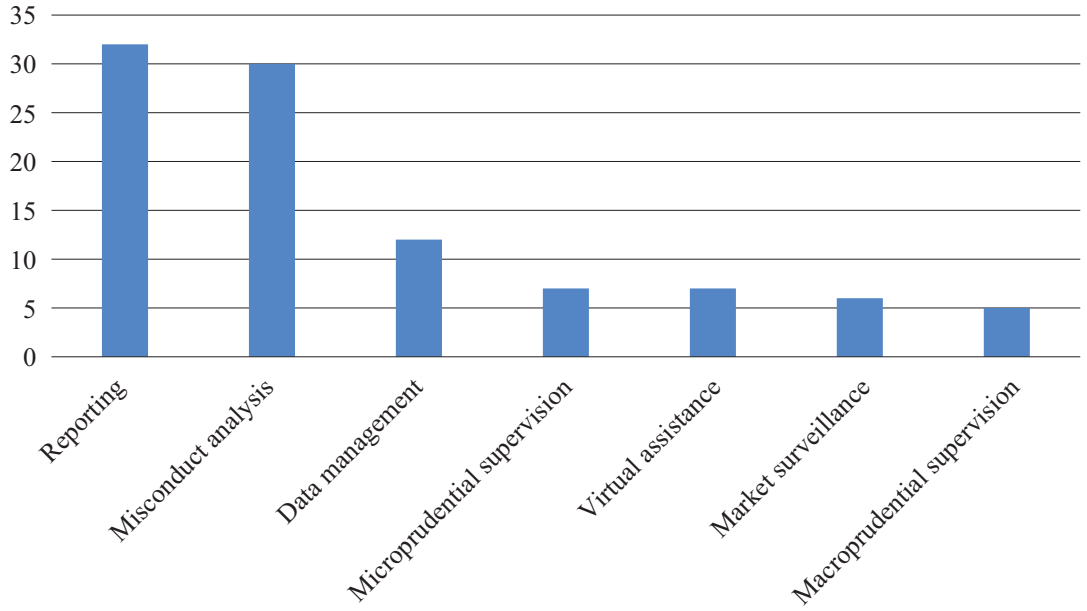
Sup Tech poses several uncertainties as well. The most important risks and challenges for Sup Tech are:

– cyber-attacks – with the rise of new technologies, hackers could be willing to attack Sup Tech systems or exploit bugs and limitations during early stages of development,
– system crash – increased importance of IT risk and system failure on the global or local scale,
– over-reliance on technology by both regulators and banks – risk of little involvement from employees in supervisory process, could pose a threat of missing several compliance violation or financial crimes (Patel B., 2018).

5. SUP TECH SOLUTIONS IMPLEMENTATION AND ASSESSMENT

Sup Tech solutions are being implemented mostly in reporting (32%) and misconduct analysis (30%). Key areas of Sup Tech implementation are depicted in chart 3.

Chart 3
Share of key areas of Sup Tech implementation (%)



Source: Di Castri S., Hohl S., Kulenkampff A., Prenio J., The suptech generations, Bank for International Settlements, 2019.

In reporting, vast majority of solutions concern automated reporting, while in misconduct analysis refer to AML/ CFT detection. In spite of the fact that Sup Tech market is currently in infancy, its' solutions are being implemented across supervisory entities globally. Sup Tech is believed to have the best results, while supporting experts by freeing their time on repetitive tasks and providing necessary information to help making judgement call (European Central Bank, 2019).

One of the most significant Sup Tech solutions was implemented in Austria. The central bank of Austria (OeNB) was facing issue with the lack of data harmonization submitted by banks, as well as technology gap from different IT systems between both parties. Because of that, AuRep (Austrian Reporting Services GmbH) was established in 2015. This company is owned by seven largest banks in Austria, accounting for ~87% of national market share. Its aim is to decrease time of regulatory process, lower cost of compliance and implement standardization in data collection on the market. AuRep uses data push approach, due to which each entity

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prepares data in standardized format that is later on sent to central bank. This system is being used in the vast majority of the market and has been an improvement over previous supervisory process, where data was collected over different frequencies and levels of aggregation (Lux J., Piechocki M., 2015).

Case of Sup Tech solution implementation in misconduct analysis took place in Singapore. Monetary Authority of Singapore (MAS) aimed at improving detection of AML/ CFT violations on the national market. It developed data analytics system based on Natural Language Processing (NLP) to search through thousands reports in order to identify cases with the highest likelihood of AML/ CFT violation. With those automatic identifications, supervisors could focus their efforts not on time-consuming manual process, but on particularly suspicious documents and reports. This approach not only improves efficiency in supervisory process, but also helps to detect data patterns that human would not be able to see (Broeders D., Prenio J., 2018).

Moreover, Bank of Italy implemented Sup Tech solution for data management as well as microeconomic and macroeconomic supervision. Bank of Italy established IT infrastructure with advanced statistical programs (Python, R, Matlab, Spark), which is linked to IT infrastructures of other financial entities. Because of such programs, Bank of Italy can develop macro and microeconomic models more efficiently, and also analyze qualitative data (such as social media sentiment) to assess non-quantitative indicators (Broeders D., Prenio J., 2018).

What is more, Australian Securities and Investments Commission (ASIC) developed Sup Tech platform named Market Analysis and Intelligence (MAI). It operates by collecting real-time data from companies and their transactions. On the basis of the data, it provides risk assessment of the national market and identifies key cases that require further investigation. Due to several technologies that it uses such as advanced analytics in R and Python, it can also predict future outlook of the whole national financial market (Broeders D., Prenio J., 2018).

Sup Tech implementation was successful not only in developed markets, but also in emerging ones. Major case of Sup Tech solution implementation took place in Rwanda in 2017. In Rwanda, policymakers put strong emphasis on financial inclusion, therefore numerous various financial service providers were being established. Although it improved competition on the market, it also challenged supervisors to cover different financial entities with various profiles and capabilities. Because of that, National Bank of Rwanda together with Sunoida Solutions company, developed Electronic Data Warehouse (EDW) aiming at automating and boosting efficiency of supervisory process. Contrary to OeNB, National Bank of Rwanda uses data pull approach, where it can automatically pull necessary data from financial entities. In spite of the fact that financial market in Rwanda is different and has different challenges than financial markets in developed countries, Sup Tech application was successful (Kamali W., Randall D, 2017).

6. FUTURE OUTCOMES AND CONCLUSIONS

The research paper aims to test hypothesis, which is as follows:

– Sup Tech is becoming an innovative tool for banking supervision and is expected to have increasingly larger role in banking supervision

After using the following methods: critical analysis of literature and research papers, descriptive method and comparative analysis of presented data, the hypothesis can be proven positively.

Demand for Sup Tech solutions is on the increase due to several drivers, which are: unstructured data, large complexity of data, limited manual resources in several countries as well as identification of potential new risks in the sector. Sup Tech solutions are applicable in numerous areas such as: reporting, virtual assistance, data management, misconduct analysis etc. Case studies from Austria, Rwanda, Singapore and Italy depict that central banks are able to collaborate either

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with banks, technology companies or develop infrastructure by themselves. Banks are especially aiming at reducing effort and cost in compliance, especially considering COVID-19 pandemic and loss in market capitalization. Post financial crisis, number of banking regulations have been of significant increase and penalties for non-compliance were also high. Therefore banks have been spending significant share of overall budget on compliance over business operations. It can be concluded that both banks and supervisory entities aiming at reducing cost and time of the supervision process with the use of new technologies. Successful implementation of Sup Tech solutions could result in increased efficiency of the overall supervision process. The aim of the article was to present Supervisory Technology (Sup Tech) and depict successful implementation of Sup Tech solutions worldwide.

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The Impact of the Turkish Presidential System on the Turkish Lira

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ABSTRACT

The political system always has a significant impact on economic indicators. Currency exchange is one of the indicators, which is influenced directly or indirectly by political developments. Investors and economic agents make investment decisions by not only economic outcomes but also political developments. Turkey is one of the countries, which can be an example of a domestic currency losing value significantly due to undemocratic political actions since the 2017 referendum. Therefore, in this study, the impact of the new presidential system on the Turkish Lira is investigated using the Bayesian structural time-series model in R software.
According to the literature search, this study is the first article that analyzes how much the Turkish Lira decoupled negatively from peers and how badly the Turkish presidential system harms the Turkish Lira.
According to the result, the undemocratic and unorthodox economic and political implementations cause the Turkish Lira to have dropped sharply and have decoupled negatively from other currencies significantly.

JEL Classification: E00, F50, F31, P16

Keywords: Turkish Lira, Currency, Democracy, Bayesian structural time-series model

1. INTRODUCTION

Currency is one of the most significant economic indicators for countries. Many developing countries are heavily oriented with the currency rate since they import and export goods and services by using foreign currency, mostly the American dollar. Therefore, shock and any sharp changes in the currency exchange rate might lead to an economic recession and devastate the economies. For instance, the 1994 Mexican, 1998 Russian, 1999 Brazilian, and 2001 Argentinean and Turkish currency crises caused economic, social, and political unrest (Frieden, 2014, p. 8).

The currency exchange rate has many significant impacts on economic factors. Rapid climb in the currency rate wreak damage on countries' import and export markets. Many economies import many raw materials and intermediate goods from other countries by using reserve currencies[1]. When the reserve currencies appreciate against the local currencies, many developing countries

[1] Reserve Currencies: the British Pound, the Chinese Renminbi, the Euro, the Japanese Yen, and the U.S. dollar (Tovar & Nor, 2018, p. 5).

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are dragged into the inflationary and slow-economic-growth environment due to the fact that goods that local companies produce by using the imported raw materials or intermediate goods that are more expensive than before. And those imported more costly raw materials and intermediate goods drive the output price up. Hereat, as a result of the appreciated foreign currency rate, inflation occurs, and people's purchasing power fall, which causes the economic slow-down (Ha, Stocker, & Yilmazkuday, 2019, p. 4).

Political instability, political issues, and the system of government impact the currency rate. The undemocratic governmental policies frighten the investors and cause instability in the currency exchange rate. Autocratic regimes or dictatorships might have undemocratic applications that depreciate the local currency. The reason for depreciation is that investors and economic agents mostly want to be in a democratic environment where the judicial system protects property rights and any other rights (Salhi & Bolle, 2007, p. 4).

Freeman et al. (2000) asserted that politics have a more negligible effect on the currency market in a country in which the electoral system is proportional representation. Politics have more impact on the currency market, where the electoral system is the majority-plurality system. It means that in the majority-plurality system, more autocratic executives have more interventionist actions and tend to repress the currency rate. Turkey transferred its political system from a parliamentary (the *proportional* system) into a presidential system (the *majority-plurality* system) in 2017 and carried into practice in 2018 with the first presidential election. The new presidential system gave enormous power to the Turkish president, who used its power to intervene in the currency exchange rate in order to appreciate the Turkish Lira (Tumturk, 2019; Strohecker, 2020).

As mentioned above, Turkey replaced the parliamentary system with the Turkish-style presidential system, which equipt the Turkish president with strong executive power. This undemocratization development caused destabilization in the economy. Therefore, in this study, the effect of the new Turkish presidential system on the Turkish Lira will be investigated using the Bayesian Structural time-series model in R software. The weekly data covers between the 1st of January 2013 and the 15th of January 2021, with the treatment date of the 24th of June 2018 (the presidential election). This research will provide whether the Turkish Lira dissociates adversely from other currencies since the new system in practice.

This study and the study result will contribute to academia since this is a unique research subject that I could not find any similar paper. In Turkish and English, no scholar and researcher has examined the impact of the new Turkish presidential system on the Turkish Lira.

2. LITERATURE

Kutan and Zhou (1995) investigated the Polish exchange market and reached a result that sociopolitical unrest cause volatility in the exchange market. Freeman et al. (2000) scrutinize the nexus between democracy, election results, and the currency market. They affirmed that the undemocratic political system and the uncertain election results induce instability in the currency market. Crowley and Loviscek (2002) elaborated on the exchange returns of Latin American countries and remarked that the politically unstable environment has a significant impact on the currency returns in a negative way. Chau et al. (2014) examined MENA countries and revealed that political uncertainty and conflict increase the currency market's unpredictability. Bouraoui and Hammami (2017) analyzed five Arab spring countries (Tunisia, Egypt, Libya, Syria, and Yemen) in terms of the exchange rate movement during the political conflict period. The result shows that political instability impacts the local currencies negatively. Bahmani-Oskooee et al. (2019) remarked that the unstable political system depreciates the exchange rate in developing countries. They suggested that developing countries focus more on stabilizing the political factors in order to have a stable exchange rate.

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Mishkin (1998) propounded that in democratic countries, central banks are fully independent and accountable. Therefore, the exchange rate policies are not placed under the pressure of the government. Broz (2002) articulated that democratic regimes tend to apply a floating exchange rate system on the currency market, while opaque autocratic regimes are more likely to use a fixed exchange rate regime. Furlan et al. (2012) found by conducting empirical research that democratic implementations appreciate the real exchange rate. They also asserted that undemocratic regimes cause depreciation in the real exchange rate.

Steinberg and Walter (2013) wrote in their research papers that there is no significant political variable that influences the exchange rate all the time.

3. DEMOCRACY IN TURKEY

Turkey was founded in 1923 as a republic state. The governmental system was a parliamentary system managed by a primine minister and ministers whom voters elected. Except for the military junta period, democracy was always functioning somehow (Arslan, 2015, pp. 133, 134, 135). In 2017, Turkey held a referendum to ballot the new governmental system by reforming the constitutional law (Marszalek-Kawa & Burak, 2018, p. 104).

With the new system, the Turkish presidential position attained more sweeping power that is abuse-liable. The Turkish president has enormous control over institutions and judicial systems, making the president an authoritarian figure (Kirisci & Toygur, 2019, p. 5). The Turkish political power over institutions and financial markets startled local and international investors and economic agents. Especially in 2018, with the political transition process, economic agents and investors' expectations[2] turned negative. Economic actors had negative expectations as to the future of Turkish economics because, since the failed coup attempt in 2016, the Turkish government has been imposing oppressive regime power on citizens and institutions (Freedom House, 2020).

As seen in Figure 1, Turkey has fallen sharply in the democracy index. Since 2016 when the new governmental system's discussion took place, Turkey dropped from 5.04 to 4.09, which means Turkey undemocratized its governmental structure and plunged into a more repressive regime with the new presidential system that intervenes in the currency exchange market using unorthodox economic instruments. The head of the ruling party, for instance, claimed that the high-interest rate tends to increase the inflation rate (Koc, 2021). As a result of that belief, the government pressured the Turkish central bank to cut the policy rate. Due to the fact that the central bank governors disobeyed what the head of the government requested, the Turkish president dismissed several Turkish central bank governors in a short period of time, even if it is illegitimate. (Bilgic & Koc, 2020). Briefly stated, the unorthodox and undemocratic economic and political developments dragged investors and economic actors into negative expectations making the Turkish Lira unstable and fragile.

[2] Present expectaions predestine the future value of economic activites. Economic agents by looking at current developments try to size up the a country's economic direction (Carter & Maddock, 1984). The Political unrest or democratic development also acts upon the investors and economic agents decisions. Therefore, the currenct news and events could change expectations and influence the economic factors such as currency exchange rate.

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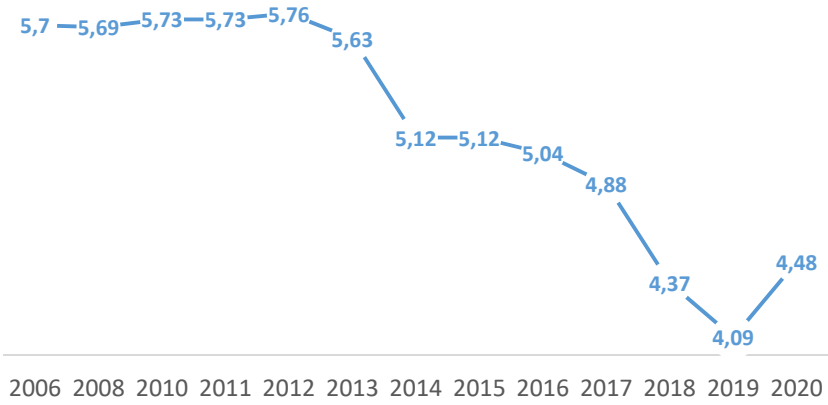
Figure 1
Democracy Index of Turkey



Source: The Economist Intelligence Unit, 2021.

In short, Turkey lost ground in the democratic area. Replacing the parliamentary system with the presidential system moved Turkey down in the democracy index. Democratic or undemocratic applications shape the decision of investors and economic agents. Doces (2010) uncovered that democracy and democratic application attracts investors. That means that undemocratic implementations could cause investors to withdraw their investment (depreciate the domestic currency) from the market where the repressive regime in charge. Therefore, examine Turkey's democracy index is essential to understand the econometric result more frankly. This finding will interpret in the conclusion part by blending with the result of the empirical research.

4. METHODOLOGY

In this research, Bayesian Structural Time Series Model is used. Equations (1) and (2) define the state space and observed data, respectively. Using the Bayesian model, the time series model for the short-run and long-run forecasting can be built.

$$y_t = Z_t^T \alpha_t + \varepsilon_t \tag{1}$$

$$\alpha_{t+1} = T_t \alpha_t + R_t \mu_t \tag{2}$$

$\varepsilon_t \sim N\left(0, \sigma_t^2\right)$ and $\mu_t \sim N\left(0, \theta_t^2\right)$ are independent of all other unknowns. Equation (1) is the *observation equation*, which related to observed data y_t to a latent dimensional state vector α_t, and Z_t is a vector of model parameters. Equation (2) is the *state equation*. T_t denotes transition matrix, and R_t denotes structural parameter. Z_t, T_t, R_t have values between 0 and 1, which represent the relevance for structural computation (Brodersen, Gallusser, Koehler, Remy, & Scott, 2015; Jun, 2019).

Forex data is used to investigate the currency movement of the Turkish Lira. It is weekly data and between the 1st of January 2013 and the 15th of January 2021. The econometric model focuses on the treatment year, which is the 24th of June 2018, when the Turkish presidential election was held. The data was collected from Yahoo Finance by using a coding program in R software.

All of the data is collected in the nominal value. However, Turkey, Brazil, India, South Africa, and Argentina had a high and similar inflation rate between the years 2013 and 2021. As a consequence of the inflationary economy, the domestic currency will tumble down by the rate

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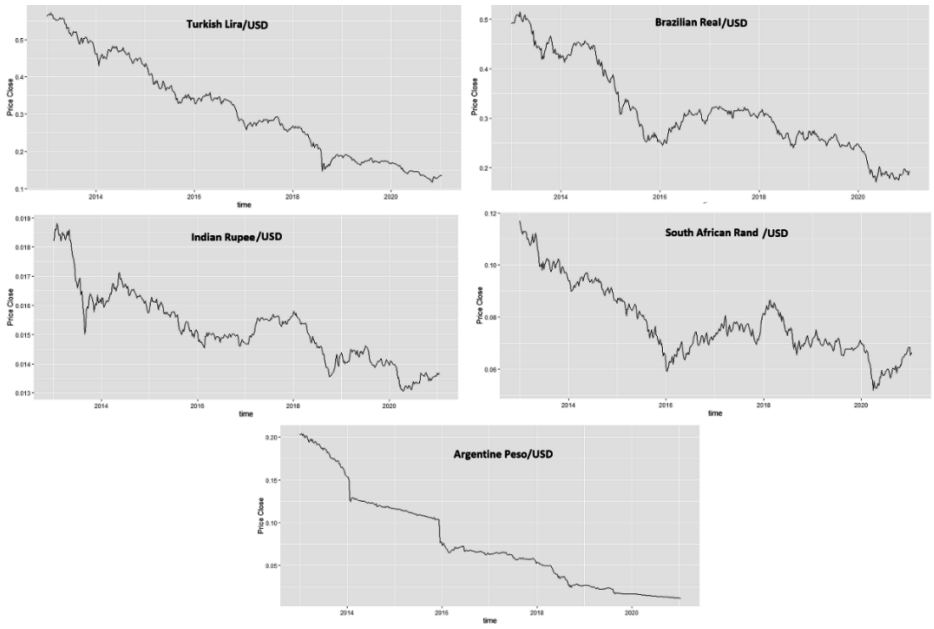
of inflation (Siddaiah, 2009, p. 279). Therefore, the nominal value breaks no squares in the result of this research.

The forex data of the Turkish Lira, Brazilian Real, Indian Rupee, South African Rand, and Argentine Peso against the American dollar[3] is examined in the research so as to find a causal impact of the new Turkish presidential system on the Turkish Lira. Firstly, a correlation matrix is implemented to observe the relationship among the currencies. The strong correlation between variables strengthens the correctness of the result because the Bayesian model forecast and predict the impact by using other variables. Therefore, the strong correlation among variables is of paramount importance. Subsequently, the Bayesian structural time series model is applied to analyze whether the new presidential system positively or negatively affects the Turkish Lira.

As has been seen below in Figure 2, since 2013, all currencies, as well as the Turkish Lira, fell aggressively against the American dollar. Many factors caused the fall, such as the Fed stopped the monetary supply, which was initiated right after the 2008 global crisis. The money supply, the enormous amount of capital that flowed into emerging economies, appreciated the local currencies against the American dollar (Frankel, 2011). However, after Fed had suspended the money expansion policy and started to raise the interest rate, the currencies of emerging markets began to tumble down.

Figure 2
The chart of five currencies between the year 2013 and 2021



Source: Author, using R Studio.

Fifty countries' exchange rate data were scrutinized in order to find the strongly correlated countries with the Turkish Lira. As a result of scrutinizing the variables, the outcome was that the Turkish Lira and other currencies, seen in Table 1, are positively and highly correlated. It means that all of those five currencies have a comparable character and akin market trend in the exchange market. This strong correlation helps us find exact results on how the Turkish Lira moved in the exchange (forex) market after the 24th of June 2018 (the beginning of the new governmental system).

[3] Parity Code:
Turkish Lira/USD – TRYUSD = X
Brazilian Real/USD – BRLUSD = X
Indian Rupee/USD – INRUSD = X
South African Rand/USD – ZARUSD = X
Argentine Peso/USD – ARSUSD = X

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Table 1
Correlation Matrix of the Currencies.

Turkish Lira	1.0000000
Brazilian Real	0.8899827
South African Rand	0.8328260
Argentine Peso	0.9553548
Indian Rupee	0.8213122

Source: Author, using R Studio

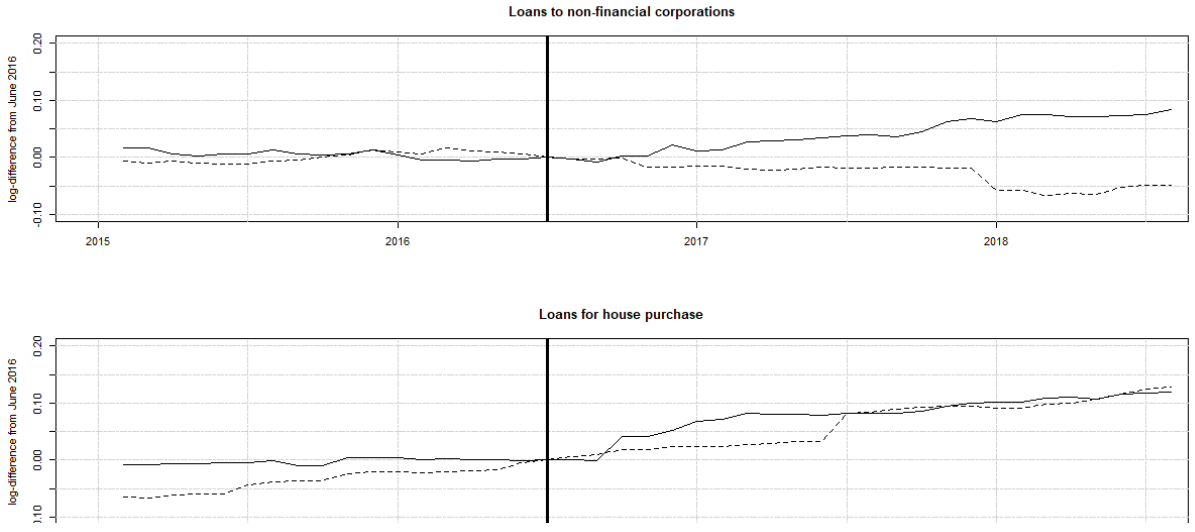
After finding the strong correlation between the Turkish Lira and other variables, the Bayesian structural time-series model is implemented in the treatment period of the 24th of June 2018. The Bayesian model enlightens how the Turkish Lira could have been if there had not been a governmental system referendum and how the Turkish Lira is now.

Before conducting the Bayesian model, the seasonality was adjusted for all the variables (currencies) by 52 weeks because they are under the seasonality effect. People in some specific time period (i.e., summer season) can demand foreign currencies more than usual. Besides, normality is checked, and no normality problem is detected.

Original simulates the original statistic and a counterfactual prediction with an intervention beginning on the 24th of June 2018 (the vertical grey dashed line). *Pointwise* illustrates the observed data and counterfactual prediction. *Cumulative* shows add up the pointwise contributions from the second panel, resulting in a plot of the cumulative effect of the intervention (Brodersen, Gallusser, Koehler, Remy, & Scott, 2015, p. 249).

As shown in Figure 3, in *Original*, the Turkish Lira after the 24th of June 2018 fell under the horizontal dashed line, which is the prediction value of how much Turkish Lira should have been if there had no change in the governmental system. The model draws the dashed line (prediction line) by observing and measuring the movements of Brazilian Real, South African Rand, Argentine Peso, and Indian Rupee. The Turkish Lira, right after the 24th of June 2018, lost value and decoupled negatively from the peers.

Figure 3
Inferring causal impact through counterfactual predictions



Source: Author, using R Studio

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In *Pointwise*, as can be seen, right after the 24th of June 2018, the Turkish Lira tumbled down sharply by the effect of the new governmental system. Investors and economic agents were more likely to have negative expectations about the future of the Turkish economy due to the new system.

Cumulative demonstrates that since the 24th of June 2018, the Turkish Lira has negatively unmingled against those four currencies. It is clearly seen that the new governmental system hurts the Turkish Lira.

The posterior inference causal impact table (Table 2) also backs up our result. The Turkish Lira is 16% drossier than it should have been. The Turkish Lira, against the American dollar, is under its value. 1 Turkish Lira could have been 0.19 cents, but it was 0.16 cents on the 15th of January 2021. All econometric results are statistically significant (prob: 0.04849).

Three cents might be seen as a small amount, but three cents could have a significant economic burden on the economies when a country imports billions of dollars worth of goods and services. Therefore, imported-oriented countries might get negatively affected by any alteration of the currency exchange.

5. RESULT

The first finding is that since 2017, the Turkish Lira has been unstable and has had up-and-down trends, but anyhow, no scholar and academic have searched about the reason for the fluctuations of the Turkish Lira and the effect of the new presidential system on the Turkish Lira. Moreover, in academia, the study of the relationship between the governmental system and the currency market is rarely analyzed. Thence, this paper has the potential to contribute the academia.

Another finding is that the 2017 referendum transferred the Turkish governmental system from the *proportional* system to the *majority-plurality* system. As Freeman et al. (2000) mentioned in their article, the majority-plurality system brought undemocratic political developments that have a momentous wallop on the domestic currency. The new Turkish presidential system turned Turkey into an undemocratic country. Undemocratization and governmental press on the Turkish Lira induced the depreciation. As a result that, the Turkish Lira had an average value of approx. 0.16, as seen in Table 2. In the absence of an intervention, it would have been expected an average response of 0.19. The 95% interval of this counterfactual prediction is between 0.16 and 0.22. Subtracting this prediction from the observed response yields an estimate of the intervention's causal effect on the response variable. This effect is -0.028 with a 95% interval of between -0.061 and 0.005. The results are given in terms of absolute numbers. In relative terms, the response variable showed a decrease of -14%. The 95% interval of this percentage is between-32% and +3%. The probability of obtaining this effect by chance is very small (Bayesian one-sided tail-area probability p = 0.048). That means the causal effect can be considered statistically significant.

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Table 2
Posterior Inference Causal Impact

	Posterior inference causal impact Average
Actual	0.16
Prediction (s.d.) **95% CI**	0.19 (0.017) [0.16, 0.22]
Absolute effect (s.d.) **95% CI**	-0.028 (0.017) [-0.061, 0.005]
Relative effect (s.d.) **95% CI**	-16% (9.6%) [-35%, 3.6%]
Posterior tail-area probability p: 0.04849 **Posterior prob. of a causal effect:** 95.151%	

Note: *Mean = 0.157528645327103, SD = 0.146719088969315*
According to the R result of visualizing the sample with estimated Gaussian distribution, it is normally distributed.
Source: Author, using R Studio.

As has been seen above, the new Turkish presidential system has had an aggressively negative impact on the Turkish Lira since the 24th of June 2018, and the Turkish Lira has been negatively decoupled from other currencies. This negative decoupling brings a negative impact on the economy. The weak Turkish Lira pushes Turkey's economy into trouble because Turkey imports many essential goods, such as energy (oil and natural gas), intermediate goods (see Table 3), from other countries by mainly using American dollars or Euro. Turkey produces electricity by using imported natural gas (Ozturk, Yilanci, & Atalay, 2007, p. 207). When the Turkish Lira loses its value, Turkey spends more Turkish Lira to import the same amount of natural gas, and the electricity producers reflect the cost to the price and the price of electricity increases. Turkey needs to import raw materials or intermediate goods to produce capital goods. Namely, Turkey should import goods so as to produce goods for the domestic market. Thence, the relatively more expensive imported products cause to rise in price, which induces to cut down on people's purchasing power and trigger inflation.

Table 3
Turkey's Top 9 Imports (2019)

Machinery including computers	$ 41.7 billion
Mineral fuels, including oil	$ 22.1 billion
Gems, precious metals	$ 15.4 billion
Vehicles	$ 15.1 billion
Iron, steel	$ 13.3 billion
Plastics, plastic articles	$ 11.8 billion
Organic chemicals	$ 6 billion
Pharmaceuticals	$ 4.9 billion
Optical, technical, medical apparatus	$ 4.5 billion
Total	**$ 134.8 billion**

Source: Ministry of Trade of Republic of Turkey, 2021.

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In short, the undemocratic implementations and developments cause to increase in the risk premium, which depreciates the exchange rate. Due to the non-democratic presidential regime and its non-democratic and unorthodox economic and political applications, the Turkish Lira fell sharply in the global exchange market. The findings in this study paper match the conclusion of Bahmani-Oskooee et al. (2019), and other research articles, which claimed that undemocratic regimes and implementations trigger the shrinkage of the currency.

6. CONCLUSION

In this research, Bayesian Structural Time Series Econometric Model is employed so as to find the economic impact of the new Turkish presidential system on the Turkish Lira. Many different currencies were analyzed to obtain the strongly correlated currencies to implement the models. As has been mentioned in previous chapters, Brazilian Real, Indian Rupee, South African Rand, and Argentine Peso have a strong correlation with Turkish Lira, which means that in the currency market, all of those currencies have an akin market trend and investors put all those currencies in the same currency basket.

In 2017, Turkey went to a referendum and changed its parliamentary system with the presidential system. With the 24th of June 2018 election, Turkey began to apply the new governmental system in practice. The new system created an undemocratic habitat. The Economist Intelligent Unit exhibited that Turkey fell sharply in the democracy index and became the hybrid regime after the new system had come into effect. An undemocratic atmosphere causes the investors to slip away from the market, which depreciates the domestic currency. Because the countries where autocratic regimes rule are unpredictable. Thence, investors and economic agents have mostly negative expectations about the undemocratic countries' economies.

After the 2018 election, the international investors and economic agents withdrew their investment and left Turkey. The local investors invested in the foreign currencies against the Turkish Lira, and dollarization occurred. That has been found using the Bayesian time-series model that the Turkish Lira tumbled down dramatically right after the presidential election, and since then, the Turkish Lira has been losing its value. The Turkish Lira is 16% shoddier than it could have been. It is clearly seen that the Turkish Lira has decoupled negatively from peers (Brazilian Real, Indian Rupee, South African Rand, and Argentine Peso) and still has been depreciating as the new governmental system brings uncertainty. The weak Turkish Lira increased the inflation rate, which diminished people's purchasing power.

To sum up, Turkey should democratize its regime and governmental system to stabilize the Turkish Lira and should renovate the law of the Turksih central bank. Otherwise, the Turkish Lira will keep decoupling negatively against the Reserve currencies. As a result of the decoupling, Turkey's economy might have more issues, such as high inflation, economic shrinkage, and a high unemployment rate. To avoid economic problems, the Turkish government should apply democratic implementations and take its hands off the market and the central bank so that Turkey could attract international investors and economic actors to draw investments and stabilize its currency.

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The Effect of Targeted Monetary Policy on Bank Lending

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ABSTRACT

This paper studies the effect of central banks' targeted refinancing operations on bank lending. It utilizes data from the European Central Bank's targeted longer-term refinancing operations (TLTROs) together with monthly bank level balance sheet data from multiple countries. The effect of targeted policy is identified utilizing the institutional setting that provides natural instrumental variables and a proxy for credit demand. Unlike previous papers, this paper studies the effects on corporate loans and loans for consumption separately. The cumulative effect of TLTROs on participating banks' stock of corporate loans is estimated to be significant (about 20 per cent). However, the effect on lending for consumption is found close to zero. Furthermore, the positive effects on corporate loans are found to be driven by crisis countries suggesting that the effectiveness of monetary policy depends on the economic conditions. The paper also finds some evidence that the effect on government bond purchases is negative. This result is very different from the earlier results regarding non-targeted liquidity operations.

JEL Classification: E44; E51; E52; G21

Keywords: unconventional monetary policy, credit supply, TLTRO, bank lending

1. INTRODUCTION

When policy rates have been close to the effective lower bound, central banks have adopted a range of unconventional tools to stimulate the economy. One channel through which these tools operate is bank lending.[2] The unconventional tools have included providing banks with cheap long-term credit. For example, the European Central Bank (ECB) has conducted several longer-term credit operations that have been geared to increasing bank lending to the non-financial private sector in order to stimulate activity in the real economy and accelerate euro area inflation. Andrade et al. (2018) find that these operations have increased bank lending to non-financial corporations. Though the earlier literature has provided some evidence that supports the effectiveness of these

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[2] See for example Jiménez et al. (2012), Rodnyansky and Darmouni (2017), Altavilla et al. (2020), Di Maggio et al. (2020).

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tools, many questions have remained unanswered. Especially, the literaure concerning so called targeted refinancing operations is scarce. These targeted operations are the focus of this paper.

The first shortage of the literature is that it has not studied the effects of these liquidity operations to other types of loans than loans to firms. Because the credit market is quite different for households and firms, it is likely that the liquidity operations have very different effects on lending to non-financial corporations and lending to households, though the banks' are given equal reward for lending to households and lending to firms. Second, the literature finds that liquidity operations have increased bank lending both on the extensive margin and on the intensive margin (e.g. Benetton and Fantino, 2021). In other words, both the participation to the operations and the borrowed ammount matters. However, central banks have launched several targeted and non-targeted operations that have rather different incentive structures. Therefore, the results regarding one operation cannot be necessarily generalised to another operation. Another issue regarding the generalisation of the previous results is that the earlier literature has focused on the effects in single countries, though the effects may be very different in different economic conditions.[3] Finally, one important reason for targeting the liquidity operations in the euro area was probably the observation that non-targeted longer-term refinancing operations seemed to be used for buying sovereign debt (see Crosignani et al., 2020). Therefore, it should be analysed whether the targeted operations have had an effect of sovereign bond holdings of the banks or not.

This paper applies a difference-in-differences estimation to bank level dataset from multiple countries to analyse the effects of the second series of the ECB's targeted longer-term refinancing operations (TLTRO-II). The paper shows that the ECB's liquidity operations have boosted lending to non-financial corporations, but not the lending to households for consumption. This finding is interesting as the ECB does not favour corporate loans over loans for consumption. Unlike the previous literature, the paper finds that the positive impact is mainly explained by the effect of participation (extensive margin). The allotted amount of TLTRO-II does not seem to have been very important. In addition, the paper shows that the positive effects on corporate lending are largely driven by crisis countries. This suggests that the effectiveness of longer-term refinancing operations depends on the economic conditions under which they are implemented. The results also show that TLTRO-II did not increase participating banks' sovereign bond purchases. Instead, the effect is found negative. Thus, the results suggest that the ECB's targeting strategy was effective in this respect.

The remainder of the paper is as follows. Section 2 reviews the earlier literature. Section 3 describes the data and the used methodology. It is dividied into three subsections. The first one describes the institutional setting, the second one represents the data and the third one explains the methods used in this study. Section 4 shows the results. It begins from the baseline results that focus on the participation effect (or the extensive margin). Then it shows that assuming continuous treatment (the amount of TLTRO) yields different results. After that the section analyses potential cross-country differences between the effectiveness of TLTROs and the issue related to sovereign bond purcahses. Finally, the section considers the robustnsess of the results. Section 5 concludes.

2. LITERATURE REVIEW

Conventionally, the maturity of refinancing operations provided by central banks has been very short. For example, the maturity of the ECB's main refinancing operations is one week. In recent years, central banks have began to refinance banking sector with loans that have maturity of multiple years. The rationale of this policy change is, as Carpinelli and Crosignani (2021) note, that "In presence of uncertainty about the future role of the central bank as a liquidity provider,

[3] García-Posada and Marchetti (2016) study the effects in Spain, Andrade, Cahn, Fraisse, Mésonnier (2018) in France, Benetton and Fantino (2021) and Carpinelli and Crosignani (2021) in Italy.

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short-term liquidity is ineffective in stopping an ongoing credit contraction". Furthermore, central banks have began to incentivise banks to use this credit for lending to non-financial private sector (e.g. TLTROs in the euro area and Funding for Lending in the UK). In the euro area, the ECB launched the first series of TLTROs in the year 2014.

As these targeted tools are rather new, there are not many published papers that study their effectiveness. When it comes to non-targeted operations, Andrade et al. (2018), Carpinelli and Crosignani (2021) and García-Posada and Marchetti (2016) provide some evidence about their effectiveness using bank level data from single countries. VAR evidence is provided by Darracq-Paries and De Santis (2015).

When it comes to targeted operations, that is the main interest of this paper, Balfoussia and Gibson (2016) show that the first series of TLTROs (TLTRO-I) incresed lending to firms. In addition, contemporaneously with this paper, Benetton and Fantino (2021) show using data from Italy that TLTRO-I lowered the rates of corporate loans and incresed their amount. In addition, they find that the competition between banks matters for the effectiveness of targeted lending progmmes.

3. DATA AND METHODOLOGY

3.1. TLTRO-II

TLTRO-II was launched in June 2016 to ease private-sector credit conditions and stimulate credit creation. Four operations, one each quarter, were conducted, with the final operation taking place in March 2017. TLTRO-II loans carry a maturity of four years, so e.g. the first operation matured in June 2020. The borrower banks are also able to repay voluntarily the amounts borrowed at a quarterly frequency starting two years from the settlement of each operation.

Banks could borrow a total amount of up to 30 per cent of a specific eligible part of their loans in January 2016, less any amount previously borrowed and still outstanding under the first two TLTRO-I operations in 2014. Eligible loans included loans to non-financial corporations and households (excluding loans to households for house purchase).

The interest rate of the operations was fixed to match that of main refinancing operations (MROs) prevailing at the time of allotment. Nonetheless, the participating banks were given an incentive to increase their eligible lending by promising a lower rate if the eligible lending was increased enough in the period between February 2016 and January 2018 in comparison to bank specific benchmark. The lowered rate could be as low as the rate on the deposit facility (-0.40 per cent).

The bank-specific benchmark depended on eligible net lending as follows. For the banks with positive eligible net lending in the 12-month period before January 2016, benchmark net lending was set at zero. For the banks with negative eligible net lending, benchmark net lending was the same as eligible net lending in the 12-month period before January 2016.

The incentives in TLTRO-II to increase eligible lending differed from the incentives in TLTRO-I. In TLTRO-I, the banks were pushed to increase their lending by offering them more TLTRO-I credit when they increased their eligible lending. However, the banks were able to reduce their lending after they had borrowed their preferred amount of TLTRO-I credit. A key difference between TLTRO-I and TLTRO-II was also the maturity. TLTRO-I credit borrowed in September 2014 matured after four years, but the last operation of TLTRO-I matured after about two years. The key differences between VLTRO operations of 2011–2012 and TLTRO operations are summarised in Table 1.

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Table 1
Main features of the ECB's longer-term refinancing operations in recent years

	VLTRO	TLTRO-I	TLTRO-II
Implementation	2 operations (12/2011 and 2/2012)	8 operations between 9/2014 and 6/2016.	4 operations between 6/2016 and 3/2017.
Interest rate	Average MRO rate	First operations: MRO rate + 10bp at time of allotment. Subsequent operations: MRO rate only.	MRO rate at time of allotment. Possibility for lowered rate if eligible net lending increased sufficiently.
Maturity	Both operations carried maturities of 3 years.	All operations mature in 9/2018.	Every operation has a maturity of 4 years.
Amount	Full allotment	9/2014 and 12/2014: Max. 7% of eligible loans in 4/2014. 2015-2016: Max. 3 x eligible net lending relative to bank-specific benchmark.	Max. 30% of eligible loans in 1/2016, less any amount previously borrowed and still outstanding under the first two TLTRO operations in 2014.

Source: ECB's press releases.

Table 2
Descriptive statistics grouped by decision to participate in TLTRO-II

Variable	TLTRO-II participant (n = 97)		TLTRO-II non-participant (n = 90)	
	Mean	Median	Mean	Median
Balance sheet (million €)	106 989	40 043	72 290	14 203
Central bank credit to total liabilities	4.4%	2.5%	0.7%	0.0%
Household deposits to total liabilities	25.5%	24.3%	33.7%	36.5%
Equity ratio	10.4%	9.1%	10.0%	8.2%
Eligible credit to total assets	26.0%	24.9%	27.1%	27.0%

Note: The statistics are calculated from bank-level January 2015 to May 2016 averages, i.e. before TLTRO-II. Thus, statistics represent how the banks that participated in the credit operations and the other banks differed before treatment.

Source: Author's calculation

3.2. Data

The main data are taken from the ECB's individual balance sheet items (IBSI) database. The data are monthly and at bank level. The used data are from January 2015 to July 2018. The IBSI data are linked to confidential information about bank's total borrowing in TLTRO-II.

IBSI data offer several advantages. First, they make it possible to analyse TLTRO-II in multiple countries. Additionally, as the data are monthly and cover a sufficiently long time period after the treatment, it is possible to analyse how possible effects evolve over time. While IBSI does not cover all euro area banks the sample is quite large and includes about 300 large banks that are from all the euro area countries. The final dataset covers 187 banks from 18 countries due to missing data.[4] However, the data are still very representative as the interpreted bank

[4] All the banks that have missing data from necessary variables are excluded. Also, banks that experience periods during which they have not had any corporate credit, loans for consumption or loans for house-purchase are excluded because these variables are analysed in logs. This sample selection limits generalisation of the results, but makes the analysed banks more alike. All the banks from France are excluded because the data about central bank credit are missing.

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covered about 62 per cent of the total corporate loans in the euro area prior TLTRO-II. Some key descriptive statistics of the assessed banks, grouped by the decision to participate TLTRO-II, are shown in Table 2.

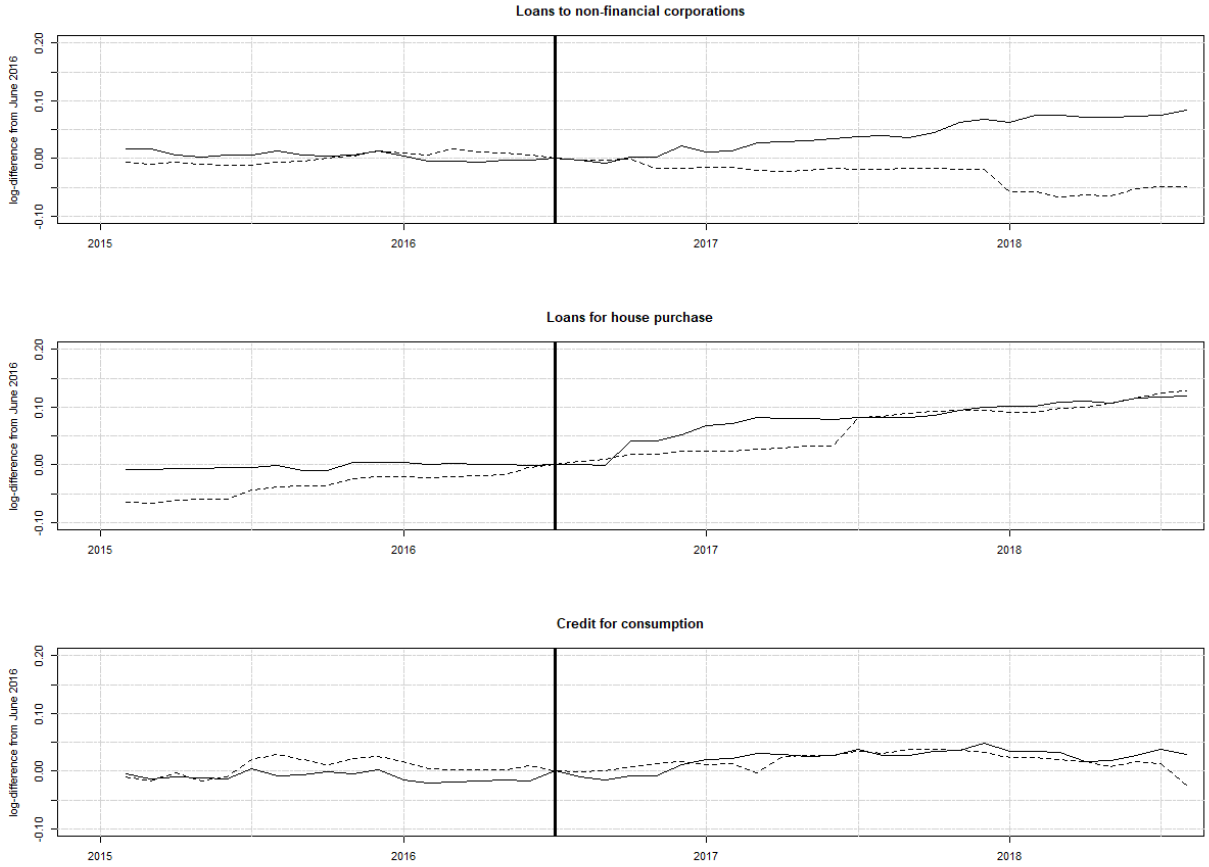
Figure 1 shows the average development of loans to non-financial corporations, loans for house purchase and loans for consumption by groups. The solid lines show the development of the TLTRO banks and dashed lines the developments of non-TLTRO banks. The TLTRO banks increased corporate lending compared to other banks after the beginning of TLTRO-II. Instead, it is rather difficult to observe significant diverging in other types of loans.

Figure 2 shows the average development of loans to non-financial corporations, loans for house purchase and loans for consumption among the banks that participated in TLTRO-II. Now, the grouping is based on the share of TLTRO-II in total liabilities. The size of balance sheet is from May 2016 (before TLTRO-II). The solid lines show the development of the banks that had the share of TLTRO-II above the median and dashed lines the developments of the banks that had a ratio below the median. The differences between groups remain rather constant. This suggests that the allotted amount of TLTRO-II was not essential.

This preliminary analysis has not taken into account the fact that banks could choose whether to participate in TLTRO-II or not. Additionally, this analysis has not considered the role of credit demand. These issues are assessed in the remaining sections.

Figure 1

The development of different types of credit in the treatment (solid line) and control (dashed line) groups in comparison to the situation as of June 2016



Note: The credit stocks are in logs. The treatment group includes 97 banks and the control group 90 banks.

Source: Author's calculation.

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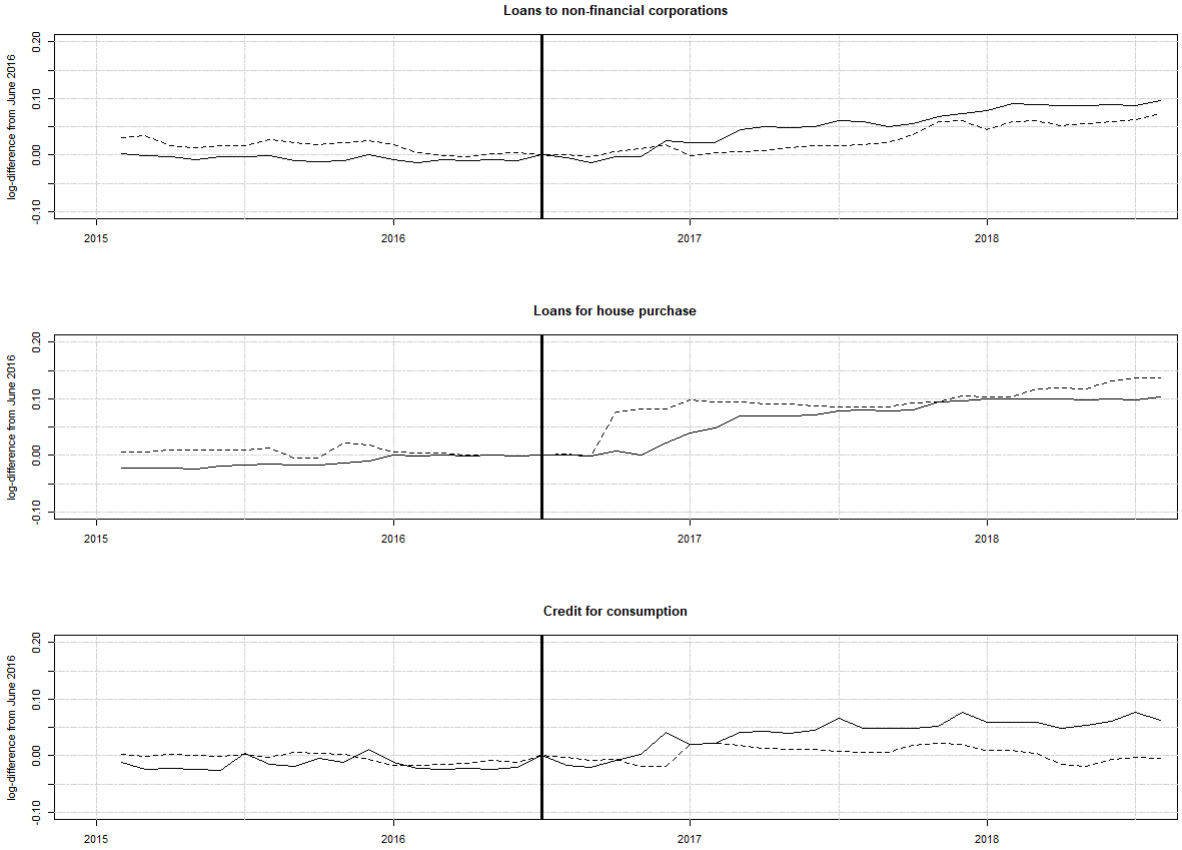
Figure 2
The development of different types of credit in the high-intensity participants (solid line) and low-intensity participants (dashed line) groups in comparison to the situation as of June 2016



Note: The credit stocks are in logs. The high-intensity group includes 49 banks and the low-intensity group 48 banks. High-intensity participants are those that had the ratio of TLTRO-II take-up to total liabilities (in May 2016) above the median. Low-intensity participants are the banks that borrowed in TLTRO-II, but had the ratio below the median.

Source: Author's calculation.

3.3. Methodology

The paper applies a difference-in-differences approach to study the effects of TLTRO-II on bank lending. It uses two types of specifications. First, in the baseline regression the treatment is assumed to be binary: participation in the TLTRO-II or not. This specification is used to assess the participation effect of TLTROs. Second, it is possible that the impact of TLTROs depends on the amount allotted to the banks. As was discussed earlier, some other studies find that the targeted operations have a positive effect on bank lending both on the extensive and on the intensive margin. The second specification is used to analyse this issue.

To be concrete, the baseline specification is:

$$\ln(Y_{ict}) = \alpha_{ic} + \tau_{ct} + \Sigma_h \beta_h (D_h \cdot TLTRO_{ci}) + \gamma Z_{ict} + e_{ict}, \quad (1)$$

where Y_{ict} is the stock of credit on the balance sheet of bank i in country c at time t, α_{ic} includes bank fixed effects, τ_{ct} includes country-time fixed effects, Z_{ict} includes time-varying bank-specific control variables that are the size of balance sheet in logs and equity ratio in the baseline analysis. $TLTRO_{ic}$ equals 1 if the bank participated in TLTRO-II and D_h, where $h \in \{2015Jan, \ldots, 2018Jul\} \backslash \{2016Jun\}$, includes indicators for time periods. June 2016 is the reference month. This means that the regression coefficients β_h tell how the credit granted by TLTRO banks differed from other banks in a given month relative to the difference between the

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groups in June 2016. Standard errors are clustered at bank and month level to allow for serial correlation and heteroscedasticity in the error term e_{ict}.

A similar approach is used by Rodnyansky and Darmouni (2017) to investigate the effects of quantitative easing on bank lending behaviour in the United States. This specification is useful because it is not realistic to assume that the effect was the same in every month after treatment as is assumed in standard difference-in-differences models. If the effect was the same every month after treatment, it would mean that the stock of credit in TLTRO participant banks jumped immediately after June 2016 and remained the same thereafter. Additionally, the estimates for the interactions before the beginning of TLTRO-II should be zero. Otherwise, the assumption of common trends would not be credible. Adding these interactions in the regression allows testing the common trend assumption.

To assess whether the allotted amount of TLTRO-II was important, we use a specification slightly different from Eq. (1). The modified model is:

$$\ln(Y_{ict}) = \alpha_{ic} + \tau_{ct} + \Sigma_h \beta_h^* (D_h \cdot \log(TLTRO\ amount_{ci})) + \gamma Z_{ict} + e_{ict}, \quad (2)$$

where the binary treatment variable is replaced by the natural logarithm of the amount borrowed in TLTRO-II.

A central challenge in this study is justifying the assumption of common development of TLTRO banks and other banks if TLTRO-II had never been conducted. Banks were free to decide whether they wanted to borrow TLTRO-II credit or not, so banks that participated in TLTRO-II may have increased their lending anyway. The coefficients may also be biased downwards, if participating banks had strong deleveraging pressures.

To tackle this selection bias, we use instrumental variable estimation. We utilise two different novel properties of TLTRO-II. First, TLTRO-II, launched in June 2016, was mainly used to replace earlier TLTROs that were mainly borrowed in 2014 and in the beginning of 2015.[5] In May 2016, TLTRO-I covered about 83 per cent of the total credit from the ECB. Therefore, the amount of credit from the ECB prior TLTRO-II is highly correlated to the amount borrowed in TLTRO-II. The amount of earlier TLTROs is also a valid instrument as it is quite difficult for a bank to forecast its lending opportunities multiple years ahead. In addition, in the first series of TLTROs, the incentive structure was such that it motivated banks to increase their lending at very beginning of the operations.[6] Therefore, it is probable that participation in TLTRO-I was not affected by the expected lending opportunities during the years 2016–2018. Thereby, the amount of TLTRO-I is a valid instrument for the amount of TLTRO-II. In Eq. (1), where the treatment is binary, we use $\left(\frac{Credit\ from\ the\ ECB\ in\ May\ 2016}{Balance\ sheet\ in\ May\ 2016}\right)_{ci}$ as an instrument for the participation in TLTRO-II. In Eq. (2), the used instrument is $\log(Credit\ from\ the\ ECB\ in\ May\ 2016)_{ci}$.

Another novel property of TLTRO-II is the fact that the amount a bank could borrow was predetermined by the ECB. This property provides another potential instrumental variable. The maximum amount a bank could borrow in TLTRO-II was based on its amount of loans to non-financial corporations and loans for consumption (so called eligible loans) in January 2016. This constraint was predetermined by the ECB and hence exogenous. Thus, the amount of eligible loans in January is another potential instrument for the participation in TLTRO-II. A similar identification strategy is used by Benetton and Fantino (2021) to analyse the effects of TLTRO-I. Because all the banks in the sample had eligible loans in January 2016, the share of eligible

[5] In the initial operation of TLTRO-II in June 2016, banks borrowed 399 billion euros. Nevertheless, the total stock of TLTROs increased only by 38 billion euros.

[6] In TLTRO-I, the participating banks were motivated to increase their eligible lending by promising a possibility to borrow more TLTRO credit if they increased lending. Because all TLTRO-I credit had to be paid back in 2018, the incentive structure motivated banks to increase their lending in the beginning of TLTRO-I. The reason for this is that the last operations of TLTRO-I had only a maturity of about two years. Thus, it was reasonable to increase lending as early as possible, and then be able to borrow more TLTRO credit with a long maturity.

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loans in total assets is a weak instrument. Therefore, the amount of eligible loans is used as an instrument only in Eq. (2) where the treatment is continuous. Specifically, the used instrument is $\log(\textit{Eligibje loans in January } 2016)_{ci}$.

In addition to the instrumental variables, the paper considers propensity score matching as a robustness check and shows that the results are robust to controlling for many observable variables.

In addition to the selection bias, another problem is the role of credit demand which is difficult to control for. Many earlier studies have utilised the approach of Khwaja and Mian (2008) and controlled the demand at firm level. Because we have no data about firms or households that had loans from multiple banks, we use country-time fixed effects. The problem in the approach of Khwaja and Mian (2008) and country-time fixed effects is the possibility of capturing supply side effects as well. If TLTROs increased the lending of all the banks and not just the lending of participating banks, then country-time fixed effects (or firm-time fixed effects) would unintendedly capture these indirect effects as well. The problem with country-time fixed effects is also the assumption that all the banks within a country faced identical credit demand. To mitigate these concerns, we test the robustness of the results by replacing τ_{ct} by τ_t and adding $\log(\textit{Loans for house purchase})_{ict}$ into Z_{ict}. The idea behind this control variable is the following. Loans for house purchase were excluded from the eligible loans. Therefore, it is likely that changes in loans for house purchase reflect mainly changes in credit demand.

4. RESULTS

4.1. Baseline results

First, we estimate Eq. (1) using 2SLS. The instrument we use is the average share of central bank credit in total liabilities in May 2016. Specifically, we instrument the interactions $D_h \cdot TLTRO_{ci}$ by $D_h \cdot \left(\frac{\textit{Credit from the ECB in May } 2016}{\textit{Balance sheet in May } 2016}\right)_{ci}$. The banks that participated in the first series of TLTROs were likely to participate also in TLTRO-II. Therefore, it is not surprising that the F-statistics of the first-stage regressions are about 41. Thus, weak instruments are not an issue.

Figure 3 shows the estimated values of the vector β_h, i.e. the estimated effects of TLTRO-II in various months for different types of credit. The solid lines represent the point estimates, and the dashed lines 90 per cent confidence intervals. Appendix A provides some more information about the model. In every month before June 2016, the estimated effects do not differ from zero, which supports the common trend assumption. The effect on corporate loans is positive and statistically significant. F-statistic for the joint significance of interactions from July 2016 to July 2018 is 2.9 ($p = 0.001$). The cumulative effect of TLTRO-II on participating banks' corporate lending is estimated to exceed 20 per cent. Instead, the estimated effect on loans for consumption is actually negative, though not statistically significantly. F-statistic for the joint significance of interactions from July 2016 to July 2018 is 0.6 ($p = 0.935$). This is surprising as TLTROs were also targeted on loans for consumption.

In the sample, the banks that took up TLTRO-II had lent about 50 per cent of the outstanding corporate loans in June 2016. If this share could be generalised to the whole population and if TLTRO-II did not affect to the banks that did not participate, it would mean that TLTRO-II increased the total stock of corporate credit about 10 per cent cumulatively from June 2016 to July 2018.

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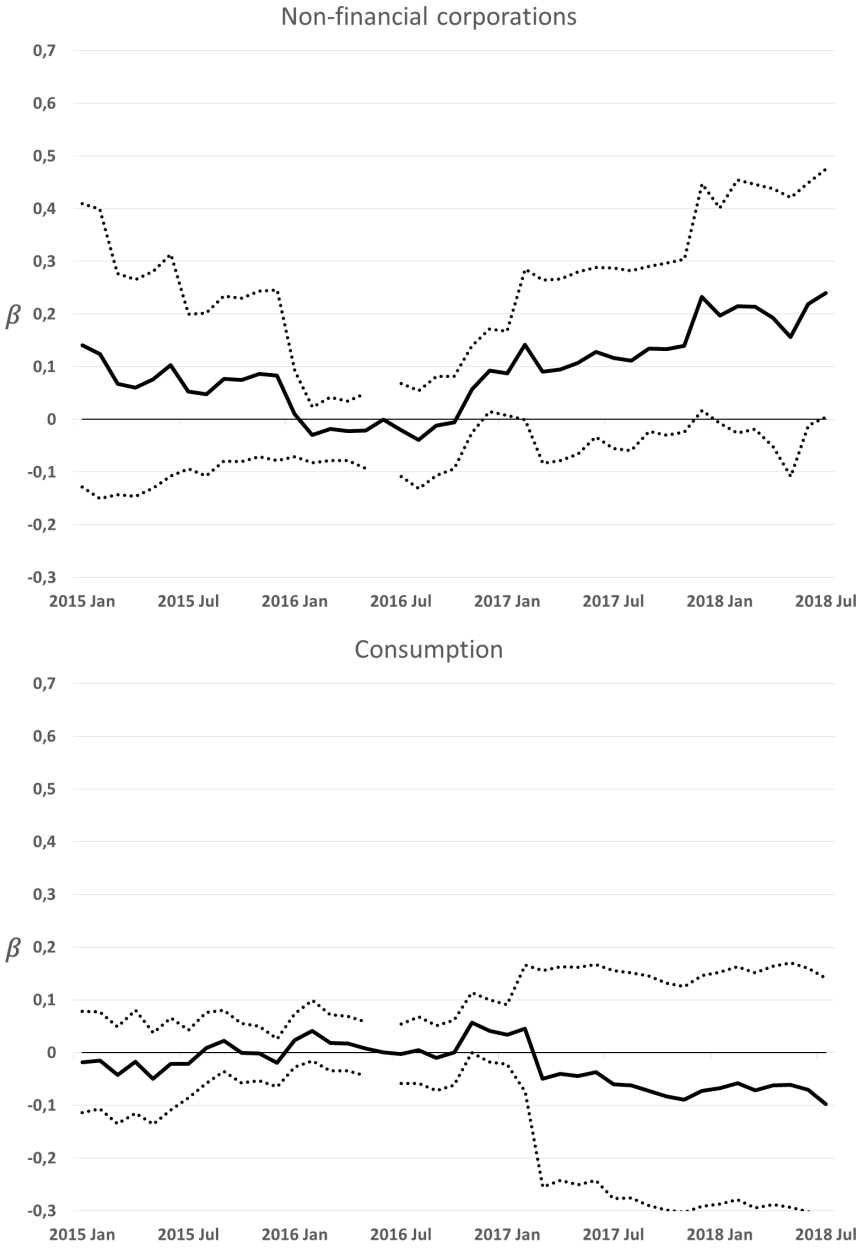
Figure 3
The estimated effects of TLTRO-II (parameters in vector β) on different types of credit



Note: The dashed lines represent 90 per cent confidence intervals. Standard errors are clustered at bank and month level. The share of central bank credit in total liabilities prior TLTRO-II is used as an instrument for participation in TLTRO-II.

Source: Author's calculation.

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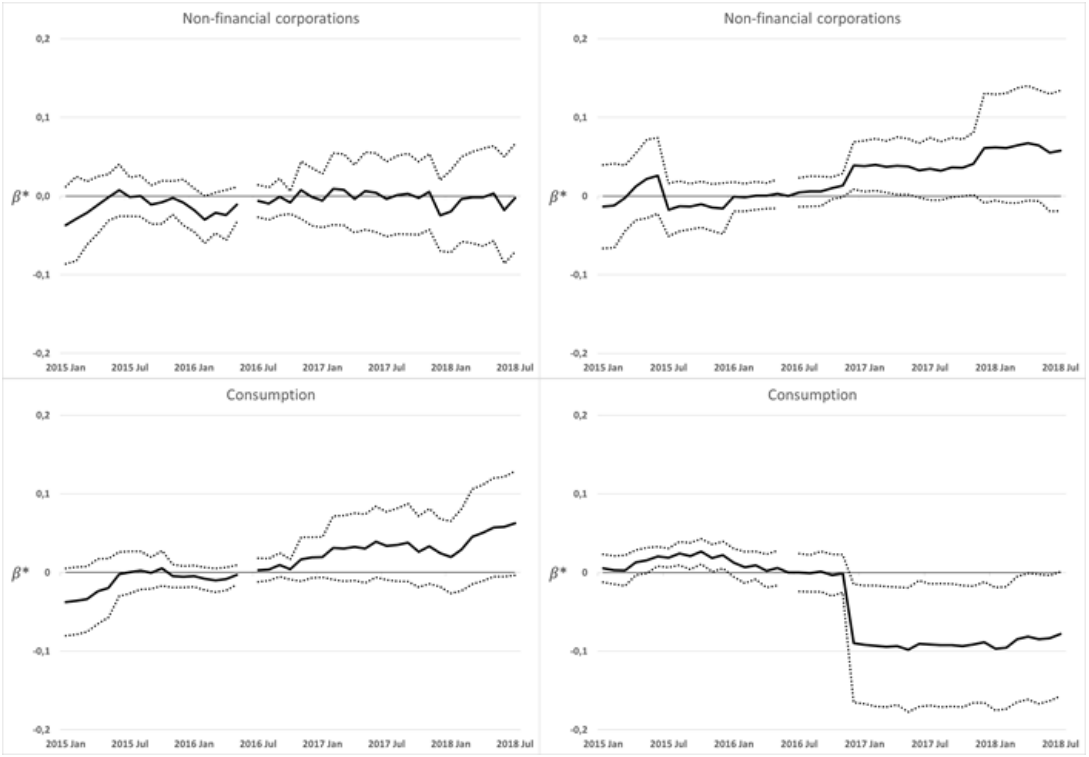
Figure 4
The estimated effects of the amount of TLTRO-II (parameters in vector β^*) on different types of credit



Note: The dashed lines represent 90 per cent confidence intervals. Standard errors are clustered at bank and month level. On left, the (log) amount of central bank credit prior TLTRO-II is used as an instrument for the (log) total borrowing in TLTRO-II. On right, the (log) amount of eligible loans in January 2016 is used as an instrument for the (log) total borrowing in TLTRO-II.

Source: Author's calculation.

4.2. The amount of TLTRO-II

So far, we have only considered the effects of a decision to participate in TLTRO-II. However, one might expect that the more a bank borrowed from the central bank, the more it increased its lending to non-financial corporations and to households for consumption. This kind of relationship is quite challenging to observe (see Figure 2). The correlation between TLTRO-II borrowing and growth in lending to non-financial corporations is practically zero (Pearson correlation is -0.02 and it is clearly insignificant).

To further asses this relationship, we drop all banks that did not participate in TLTRO-II from the baseline analysis (entire control group) and add the natural logarithm of total TLTRO-II into Eq. (2). In other words, we analyse only the banks that participated in TLTRO-II (97 banks) and group them by their TLTRO-II amounts. We instrument the (log) total take-up in TLTRO-II by the (log) amount of central bank credit in May 2016. Additionally, we use the (log) amount of eligible loans in January 2016 as an alternative instrumental variable.

Figure 4 shows the estimated effects. The estimates on the left-hand side are based on the amount of central bank credit in May 2016 and the estimates on the right-hand side are based on the amount of eligible loans in January 2016. The estimates based on eligible loans suggest that the allotted amount of TLTRO-II had an impact on bank lending. Instead, the estimates that are based on the amount of central bank credit are insignificant. The values of F-statistics for these two alternative instruments are about 14 and 269. Thus, assuming that both instrumental variables are valid, one should give more weight to the results based on the stronger instrument: amount of eligible loans in January 2016.

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The results are potentially unintuitive and puzzling, but there are also some good reasons for the conclusion that the amount of TLTRO did not matter so much. As was explained in Subsection 3.1, the banks were expected to achieve a certain threshold for their bank lending to receive lower interest rate. Therefore, banks with high TLTRO take-ups could use the part of TLTRO to something else than eligible lending without losing the low interest rate.

4.3. Cross-country differences

There are large cross-country differences when it comes to the state of banking sector or economic conditions. Therefore, it is likely that the effects of TLTRO-II were different in different countries. For example, Albertazzi, Nobili and Signoretti (2021) observe that the transmission of conventional monetary policy is stronger for weaker banks. However, their results suggest that when it comes to unconventional monetary policy, the transmission is stronger among strong banks. Boeckx, de Sola Perea and Peersman (2020) find some evidence in favour of the opposite conclusion. Thus, the literature regarding the bank lendig channel of uncoventional monetary policy tools is rather mixed. In addition there may some other reasons, why monetary policy may have different effects in different countries. More generally, the cross-country differences in the effects of monetary policy has been studied by Burriel and Galesi (2018). They find that countries with more fragile banking systems benefit the least from unconventional monetary policy measures.

To assess this question, we calculate a dummy variable that equals 1 if the bank's home country is Spain, Italy, Greece or Portugal. These countries form a group that we call "crisis countries". We replace the interactions $D_h \cdot TLTRO_{ci}$ in Eq. (1) by interactions $crisis_c \cdot D_h \cdot TLTRO_{ci}$. This means that the treatment group consists of the banks that participated in TLTRO-II and were located in the crisis countries. Otherwise, model specification and estimation are as in the baseline analysis.

The coefficient estimates are shown in Figure 5. The results hint that the effect on bank lending has been stronger in the crisis countries than elsewhere. This result indicates that it is problematic to generalise results obtained from a single country to euro area level. However, this issue requires more research. It is not clear, what is the underlying reason for heterogeneous effects. One potential reason is the state of the banking sector, but deeper analysis regarding this topic is left for the future research.

4.4. Effect on sovereign bond purchases

Crosignani et al. (2020) find that a large part of VLTROs went to buying sovereign bonds in Portugal. The fact that VLTROs was used to buy bonds in crisis countries was possibly one reason why the ECB chose to target its TLTROs. In principle, TLTROs create an incentive to replace government bonds by eligible loans. However, as discussed in the previous sections, the banks had to achieve a certain lending threshold, after which they were rewarded with a lower rate by the ECB. After achieving this threshold, the incentives in favour of eligible lending disappear. Therefore, the effect of TLTROs on sovereign bond purchases is ambiguous.

To investigate whether targeting worked as intended, we estimate the Eq. (1) as in the baseline analysis, but use the natural logarithm of sovereign bond holdings as a dependent variable and keep the treatment as in the previous section. The results are shown in Figure 6.

The results suggest that TLTRO-II worked as intended. TLTRO-II did not increase government bond holdings. Instead, the operations seem to have had a negative effect. However, the reason for this result is not necessarily the design of TLTRO-II. The different effect from Crosignani et al. (2020) might be driven, for example, by different macroeconomic conditions.

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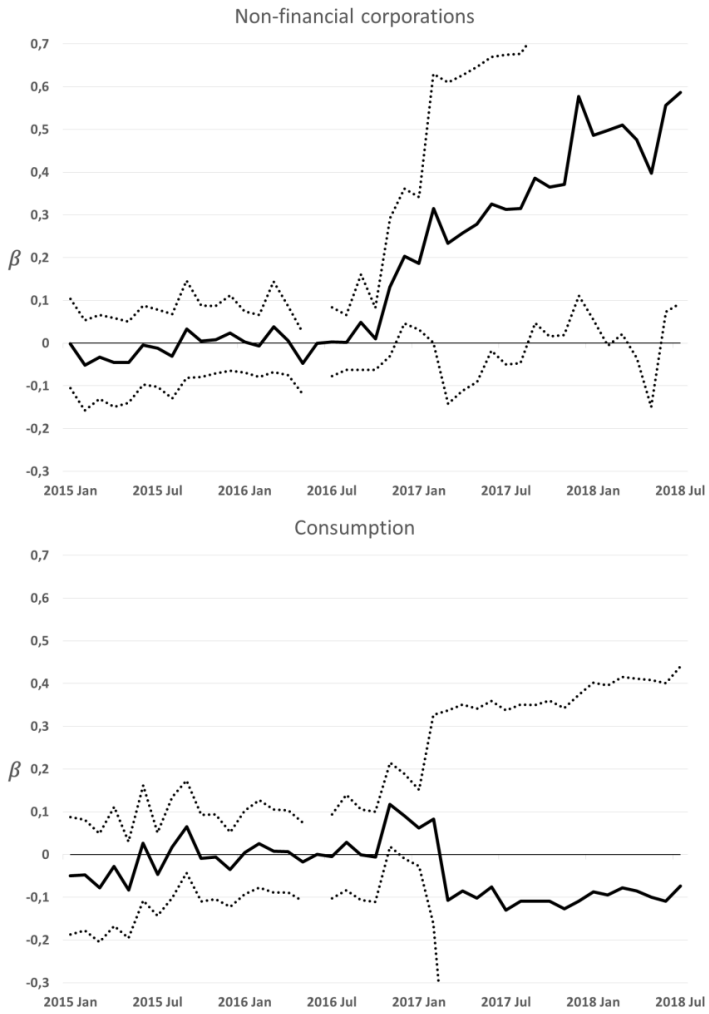
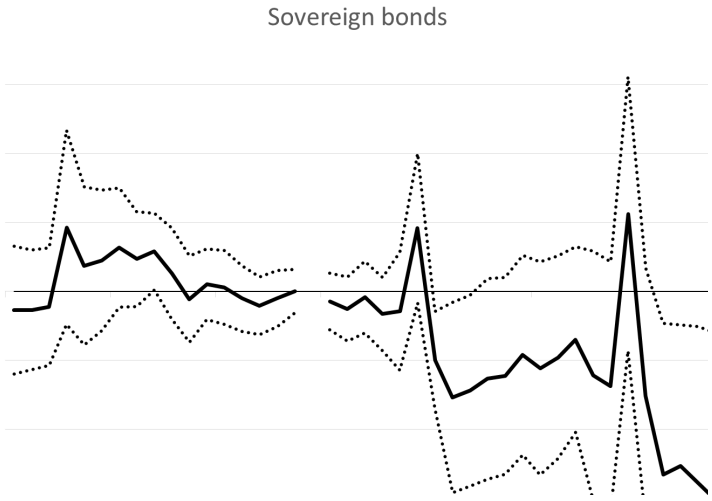
Figure 5
The estimated effects of TLTRO-II in crisis countries on different types of credit



Note: The treatment group consists of the banks that participated in TLTRO-II and are located in Spain, Italy, Greece or Portugal. The dashed lines represent 90 per cent confidence intervals. Standard errors are clustered at bank and month level. The share of central bank credit in total liabilities prior TLTRO-II is used as an instrument for participation in TLTRO-II.

Source: Author's calculation.

Figure 6
The effect of TLTRO-II on sovereign bond holdings



Note: The endogenous variable is (log) government bond holdings. The treatment group consists of the banks that participated in TLTRO-II and are located in Spain, Italy, Greece or Portugal. The dashed lines represent 90 per cent confidence intervals. Standard errors are clustered at bank and month level. The share of central bank credit in total liabilities prior TLTRO-II is used as an instrument for participation in TLTRO-II.

Source: Author's calculation.

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Table 3
Logit model used in the propensity score matching

	Participation in TLTRO-II
Predictors	**Log-Odds**
(Intercept)	-3.30*
Dlog(Loans to non-financial corporations)	-0.96
Dlog(loans for house purchase)	-16.58
Dlog(loans for consumption)	1.97
log(Balance sheet)	0.33**
Cash to total assets	-7.72
Household deposits to total liabilities	-0.91
Equity ratio	2.82
Observations	187
R^2 Tjur	0.100

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

Note: The used variables are calculated from bank-level January 2015 to May 2016 averages, i.e. before TLTRO-II.

Source: Author's calculation.

4.5. Robustness

As was shown earlier, the banks included in the sample were quite heterogeneous, for example, when it comes to their size (Table 2). With a perfect instrumental variable, this should not bias the results. However, one may always argue that the used instrumental variables are not valid, and there may be selection bias present. To analyse, if the results are driven by the differences in the treatment and control group, we use propensity score matching. Specifically, we estimate a logit model that predicts the participation in TLTRO-II based on banks' observable characteristics before TLTRO-II. Thereafter, the banks that borrowed in TLTRO-II are matched with other banks based on their estimated likelihood to participate using nearest-neighbour algorithm with replacement and calliper of 0.1.

In the logit model, we include such variables that could potentially affect the participation decision. Specifically, we include average growth rates of different types of lending before TLTRO-II. It is possible that such banks that were already increasing their lending self-selected into TLTRO-II because they believed that continuing increasing lending would be easy. On the other hand, it also possible that banks that were doing poorly self-selected into TLTRO-II, because they were unable to receive market-based funding. In addition, choosing loan growth variables makes the common trends assumption more reliable: we choose such banks that shared the common trend in loan growth. We also include the average size of the banks before TLTRO-II as the participating banks were much larger than the others. Additionally, we consider the share of cash, share of household deposits and equity ratio. The estimated logit model is reported in Table 3, and Figure 7 shows the results from the propensity score matching. The matching drops 7 banks from the treatment group (participants) and 40 from the control group (non-participants). The results show that it is rather difficult to find observable variables that could explain the participation decision. In other words, based on the observable variables, it is difficult to argue that selection bias plays a significant role.

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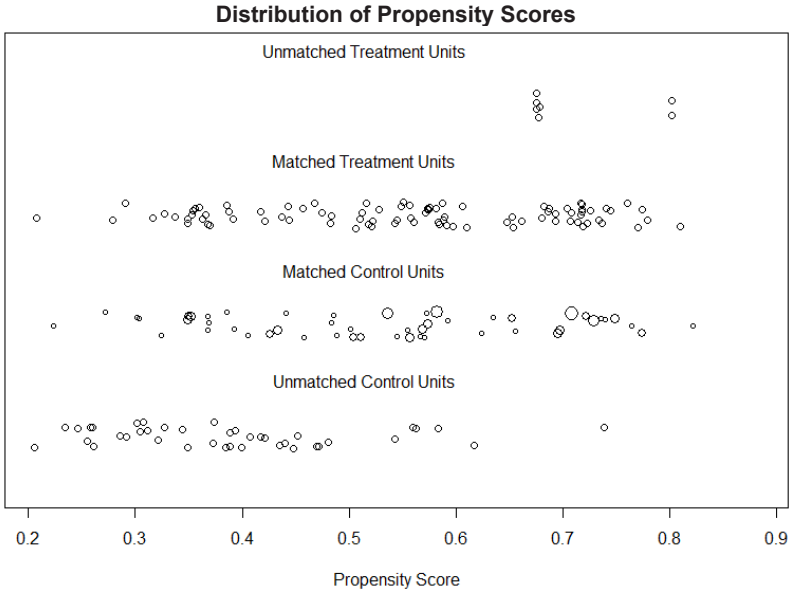
Figure 7
Results after using loans for house purchase as a proxy for credit demand



Note: The matching is done using nearest neighbour algorithm with replacement and 0.1 calliper. 7 banks are dropped from the treatment group and 40 from the control group. Thus, the final sample consists of 90 TLTRO banks and 50 other banks.

Source: Author's calculation.

The results from the baseline analysis with this subsample of banks is shown in Figure 8. The results remain roughly the same. Actually, the positive effect on corporate lending is now even more clearly statistically significant. The effect on lending for consumption is still close to zero and statistically insignificant. Therefore, it is difficult to argue that the results were biased downwards or upwards due to self-selection.

Another potential issue that may affect the results is demand. There are many ways to control for credit demand, and so far, we have used country-time fixed effects only. Figure 9 shows the results when country-time fixed effects are replaced by time fixed effects and $\log(\textit{Loans for house purchase}_{ict})$ is used as a control variable. Because TLTROs were targeted on loans to households excluding loans for house purchases, it is likely that the variation in the stock of mortgages reflects mainly variation in loan demand. The estimation is done using the full sample. This modification lowers the estimate for the effect on corporate lending a bit. The estimated effect on lending for consumption is still close to zero and statistically insignificant. Therefore, our results seem not to depend on the chosen way of controlling for credit demand.

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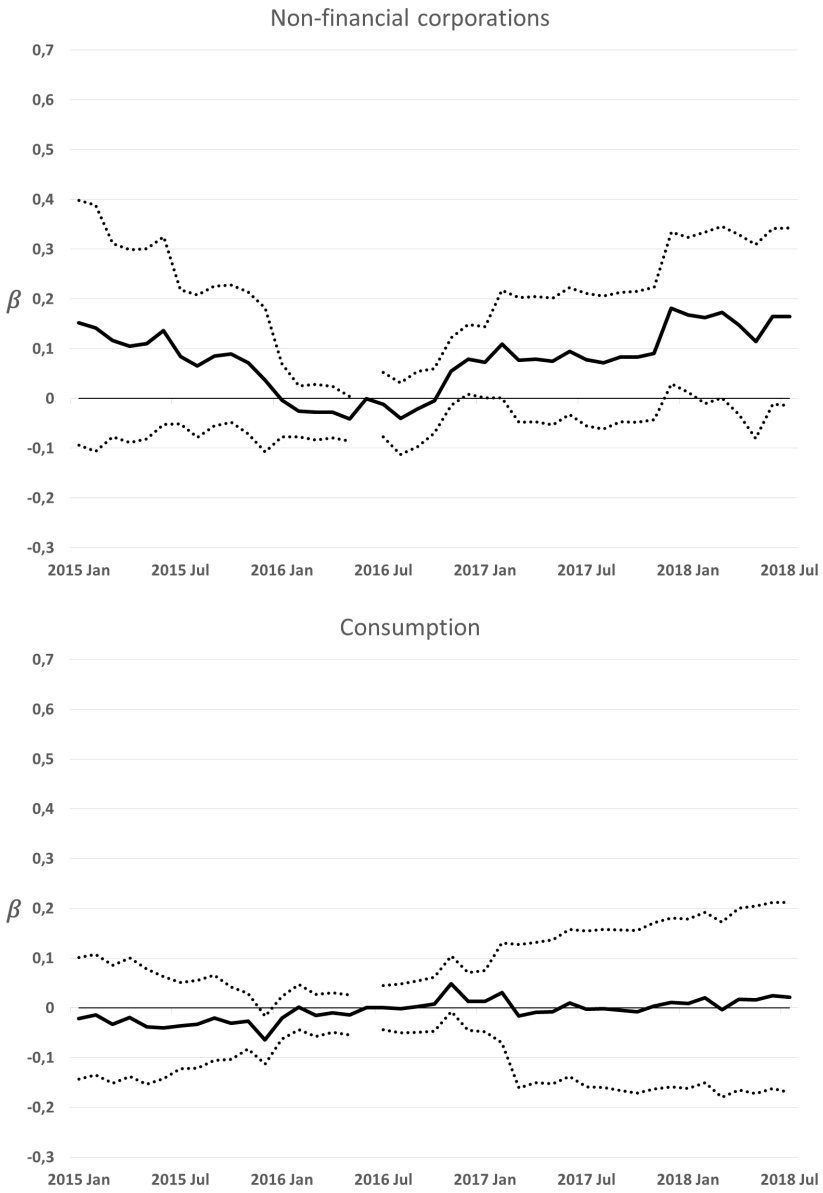
Figure 8
Results after propensity score matching



Note: The dashed lines represent 90 per cent confidence intervals. Standard errors are clustered at bank and month level. The share of central bank credit in total liabilities prior TLTRO-II is used as an instrument for participation in TLTRO-II.

Source: Author's calculation.

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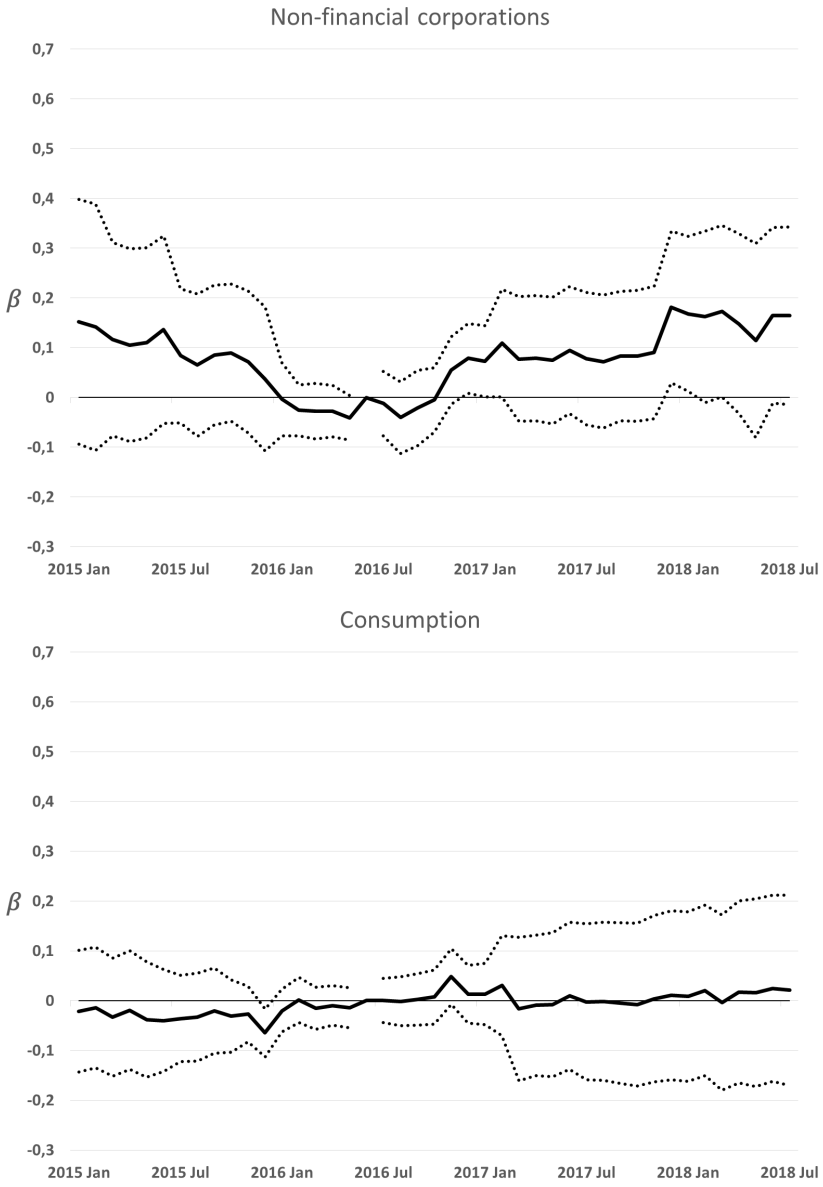
Figure 9
Results after using loans for house purchase as a proxy for credit demand



Note: The dashed lines represent 90 per cent confidence intervals. Standard errors are clustered at bank and month level. The share of central bank credit in total liabilities prior TLTRO-II is used as an instrument for participation in TLTRO-II.

Source: Author's calculation.

5. CONSLUSIONS

The results show that the effect of TLTRO-II on bank lending was positive. In particular, TLTRO-II boosted credit to non-financial corporations, while the effect on loans for consumption is estimated to be close to zero and statistically insignificant. This result is surprising as TLTRO-II was targeted equally at both consumption lending and corporate lending. Because the zero effect was unexpected, we do not have any obvious theoretical explanation for this in our mind. The explanation for the result might be related to, for example, differences in market power in different credit markets (Benetton and Fantino, 2021). One of the usual suspects for strange results in this field is the way loan demand is controlled for. In the baseline analysis, we use country-time fixed effects. This technique has its drawbacks, and therefore we assess the robustness of the results by controlling credit demand using loans to households for house purchase, which is

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excluded from the eligible lending and thus a good proxy for credit demand (especially regarding households). This alternative way of controlling for credit demand does not change the results. Another issue that might drive the results is the fact that the banks were rather heterogeneous before the treatment. If one had a perfect instrumental variable, this fact should not affect the results. Because the validity of instrumental variables is in the end a matter of argumentation, and one might maybe argue that central bank borrowing prior the treatment is not necessarily a perfectly valid instrument, we consider also propensity score matching as a supplementary technique for tackling potential selection bias. Controlling for potential variables that might explain the selection to the treatment does not change the results.

The results also suggest that the effects of TLTROs have not been the same in all the countries. This is not surprising as there are many papers that show that the effects of monetary policy are different in different countries. However, the result is important, because the earlier studies that analyse the effects of longer-term refinancing operations with microdata focus on single countries. Thus, these results are difficult to generalise to other countries. According to the results, the effects have been strongest in countries most affected by the crisis.

The results show as well that TLTRO-II did not increase the government bond purchases of the participating banks in crisis countries. Thus, the effect of TLTRO-II was quite different from the effect of the VLTROs (see Crosignani et al. 2020) and suggests that the targeting of credit operations mattered.

Though this paper has covered many open questions related to the targeted monetary policy, there are certainly many questions that should be answered in the future research. One shortage in the current literature is that it is mainly empirical. As the targeted tools are becoming more and more "conventional" in the central banks' toolboxes, it would be necessary to understand better how and why these tools work.

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APPENDIX

Table A1
Some key information about the baseline regressions

	Dependent variable:	
	Log(Loans to NFCs)	**Log(Loans for consumption)**
	(1)	(2)
log(Total Assets)	0.915**	0.914**
	(0.202)	(0.242)
Equity ratio	0.085	2.368*
	(0.886)	(1.186)
Observations	8,041	8,041
R^2	0.990	0.987
Adjusted R^2	0.989	0.986
Residual Std. Error (df = 7054)	0.191	0.213

* $p < 0.05$ ** $p < 0.01$

Note: The interactions are reported in Figure 3. Standard errors are clustered at bank and month level.

Source: Author's calculation.

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The impact of the reforms of the 2000s and the Arab Spring of 2011 on the performance of the Egyptian banking sector

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ABSTRACT

This paper aims to assess the current condition of the Egyptian banking sector, based on the past reforms of the 2000s. This analysis is based on data from the Central Bank of Egypt (CBE), data from the Egyptian banking sector and the literature review. The main finding is that despite many changes in the political and economic scene that drove the country into a crisis, the Egyptian banking sector was able to work well in the post-2008 period, achieving high growth rates. This study contributes to the academic literature on factors influencing financial development in emerging counties, based on the analysis of the Egyptian banking.

JEL Classification: G20, G21, G28

Keywords: Banks; Egyptian Banking Sector; Egyptian Revolution; Arab Spring

1. INTRODUCTION

The banking sector plays a vital role in the performance of the economy of any country as a pillar for stability and growth. Efficiency and performance have always been considered an important topic not only in the banking sector but in the economy in general, receiving wide attention from economists and policymakers. Egypt is a major player on both political and economic fronts in the Middle East and North African region; it is in the first rank in Africa in term of GDP, the second in the Arabian countries, and the 21st worldwide with 236.5 USD billion in 2017. Its GDP growth rate was 4.2% in 2017 and GDP per capita was 12 700 USD in 2017 (The world factbook, 2019).

In Egypt, banks are considered as a backbone and a basic player in the financial system as they provide financial support to the investment needs of both the public and private sectors. The total deposits in local currency have increased, from 943 972 million EGP in December 2010 to 5 535 707 million EGP in April 2021, while loans have increased by from 458 081 million EGP to 2 717 353 million in the same period, 486% and 493% respectively.[2] These figures show the

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[2] Figures are in nominal value from the monthly statistical bulletin of the CBE.

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considerable expansion of the banks' activities in Egypt, despite the economic crisis in Egypt after the revolution, as a main financial intermediary that convert household savings into investments.

One of the current debates in Egypt is whether privatization could develop and improve efficiency, profitability, and performance in the banking sector. Since the beginning of the 1990s, Egypt has enhanced its financial sector after facing huge losses and inability to compete with the private sector. The enhancement started by share issue privatization and privatizing the state-owned firms that had dominated the Egyptian economy since the nationalization of the Egyptian economy during the era of Nasser, aiming to imitate the British plan of privatization during the 1980s. However, the privatization stayed away from the banking sector until 2006 when the Bank of Alexandria (BA) sold 80% of the bank to Italian Intesa Sanpaolo Group.

Despite Egypt's significant position, there is a lack in the literature concerning the banking sector in most middle eastern countries including Egypt. Poshakwale and Qian (2011) analyzed the impact of financial reform on the production efficiency in Egyptian banks during the period 1992 – 2007. Herrera et al. (2013) examined the decrease in credit supply and demand in Egypt during the period 1998 – 2001. Hashem (2016) studied the determinants of banking sector profitability in Egypt during the period 2004 – 2014.

The aim of this paper is to outlines the current structure of the Egyptian banking sector, stressing the results of the reform of the 2000s. This study used secondary data analysis from the Central Bank of Egypt (CBE), it makes use of literature reviews, official documents, and statistics compiled by official bodies such as the CBE and Egyptian banks to determine the performance of the Egyptian banking sector following the revolution of 2011. The first section analyses the historical background, the second stresses the reform of the 2000s, their motives, trends, and results. The third section talks about the situation after the revolution of 2011. The last section is dedicated to the conclusion.

2. HISTORICAL BACKGROUND

The idea of establishing an Egyptian bank extends back to the rule of Mohamed Ali (1805–1848). Radwan (2000) states that in 1842 Mohamed Ali ordered the establishment of a bank with a capital of 700 thousand riyals; however, the project of the bank collapsed after his illness during his last years. El-Qobtan (2006) states that this bank worked only for 2 years at Alexandria where it was established before declaring bankruptcy in 1844.

According to El-Sherbini (1995) banks began to re-operate in Egypt in 1856 when the Bank of Egypt, headquartered in London, was established to support and finance trade between Egypt and UK, followed by branches of the Imperial Ottoman Bank in 1867 (founded in 1856 in Istanbul), the Banco di Roma in 1880, and the Comptoir national d'escompte de Paris in 1889.

Distinguin et al. (2013) believe that one of the roles of banks is to hold illiquid assets and provide cash to provide liquidity by funding long-term, illiquid assets with short-term, liquid liabilities. Greuning and Bratanovic (2009) confirmed that the increase in bank credit supports macroeconomic growth. However, El-Sherbini (1995) believes that it was due to its excessive offers of short-term loans that the Bank of Egypt stopped fulfilling its obligations and declared bankruptcy in 1911.

Cassis and Cottrell (2015) confirm that private banks in Europe found a place for themselves as players in the field of government loans, trade finance, and commercial credit. They also cite the case of the Bank of England (nationalised only in 1948) as an example of private banks functioning as central banks. When the National Bank of Egypt (NBE) was established in 1898, the Egyptian government granted it the privilege of issuing banknotes, convertible to gold for

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a period of 50 years[3]; the bank also carried out many of the functions of a central bank until the establishment of the Central Bank of Egypt in 1960.

Politics and social issues clearly influence banking and financial policies as well. Feldman (2015) state that in Austria after the Anschluss in 1938, following political orders, all banks established policies aimed at eliminating any Jewish presence, including customers. According to Errera (2007), anti-Semitism only began in Egypt in the 1960s, largely as a result of the political cleavages that began following the coup of 1952; this, she says, was the beginning of the stage of discrimination. Benin (2005) agrees that the situation before the coup was totally different, indicating that Jews were highly represented in the upper levels of the economy, especially in the financial and banking sectors, as they were not considered as Jews but as nationalists. Talaat Harb cooperated on that basis with Joseph Kattawi and Joseph Cicurel to establish the first independent Egyptian bank in 1920, Banque Misr.

During the second half of the 1950s, Nasser began the phase of nationalization. Barda (2006) states that after the Crisis of Suez, accounts of foreign citizens were frozen in banks across Egypt. In February 1960, Nasser nationalized Banque Misr and converted all the shares of the bank to be 12-year bonds with 5% interest. He then nationalized the National Bank of Egypt as well, dividing it into the National Bank of Egypt and the Central Bank of Egypt (see Abd El-Mejid 1989). The Egyptian General Establishment of Banks was also established to supervise the 27 existing banks.

Moreover, a series of mergers started and ended with only 10 banks in 1961 in place of 32 in 1956, according to El-Dweini (2017). That same year all banks were nationalized, including the NBE which was splatted into two banks, the NBE as a commercial bank and the CBE as a central bank of Egypt responsible of the monetary policy and issuing the banknote.[4] A new series of mergers and acquisition ended in 1971 with there being only four commercial banks (NBE, Banque Misr, Bank of Alexandria, and Banque du Caire) and two other specialized banks (one for real estate and another for agriculture).

After the war of 1973, Sadat started the Openness policy to encourage private investment. El-Dweini (2017) confirms that this allowed having two types of banks without the supervision of the CBE – Arab International Bank and Islamic Banks. El-Ansari (1993) states that during the 1980s, Egypt faced the shadow banking system, plus speculations in the international gold markets which led to losses in millions of pounds for certain banks like Development and Trade Bank.

Banking reform started in 1990 after Egypt joined the World Trade Organization, with the liberalization of deposit and lending rates. Abdel-Baki (2011) finds that the "bank reform program has helped the economy weather the impact of the global economic meltdown" and confirms that "Egyptian banks were saved from the world's financial turmoil because the CBE prohibits Egyptian banks from holding risky assets, like derivatives and securitized bonds". During the last two decades, banking in Egypt has significant achievements at the local and global levels (Hassan and Jreisat, 2016 a; Hassan and Jreisat, 2016 b).

In 2006, Bank of Alexandria – the third-largest bank – was privatized, which affected the market share of the state-owned banks in Egypt. Followed in 2007 by the acquisition of Banque du Caire by Banque Misr (both are state-owned banks). Today there are 38 banks working in Egypt, with a total number of 4 220 branches covering all Egypt with a total value of trading in the Egyptian Stock market by (6 460.7 million EGP).

[3] The first banknote issued by the NBE was on the 3rd of April 1899.

[4] Law number 250 of 1961, issued on the 19th of July 1961 amended by law number 377 of 1961 issued on the 2nd of November 1961.

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3. THE REFORM OF THE 2000S

The CBE contributes to the enhancement of the Egyptian economy. It is responsible for legalising the regulations of the banking sector, supervising the working banks in Egypt, ensuring a safe and strong banking system, managing the foreign exchange reserves, and issuing banknotes. Moreover, according to Article 5 of Law no. 88 of 2003, the CBE is responsible for the formulation and implementation of the monetary policy to maintain price stability[5]. The Central Bank of Egypt is considered as an independent body under the Egyptian constitution[6]. Keefer and Stasavage (2003) emphasize that the independence of central banks reduces inflation. Bodea and Hicks (2015) find that independence makes central banks more conservative when they are delegated to the monetary policy. This is reflected in lower rates of growth for the money supply. In addition, they found that it "reduces the risk of time inconsistency in monetary policy".

In accordance with Basel II[7], the CBE started the first phase of reform in 2004 and ended by 2008 aiming to "strengthening the banking sector and increasing its robustness to face global and regional competition effectively and help achieve economic growth". This first phase consisted of four basic pillars:

1. Privatization and consolidation processes in the banking sector aiming to create strong and efficient entities to sustain future domestic growth.
2. Addressing the problem of non-performing loans (NPLs).
3. Restructuring the commercial public banks financially and administratively.
4. Upgrading the supervision sector of the CBE.
5. Increasing the issued and fully paid-up capital to be 500 million EGP for Egyptian Banks, and 50 million USD or their equivalent for the branches of foreign banks.

The reform phase ended with the following:

1. Privatising of Bank of Alexandria by selling 80% of the bank to Italian Intesa Sanpaolo Group in 2006.
2. An acquisition of Banque du Caire by Banque Misr in 2007[8]. In 2010, BM transferred the ownership of all the shares of BDC to Misr Capital Investments (the investment arm of BM).
3. The Egyptian United Bank, The Islamic Bank for Development and Investment, and The Nile Bank were not able to withstand the part of increasing the capital. Thus, these three banks were acquired by a new entity, The United Bank of Egypt, which is the only Egyptian bank owned by the CBE (the CBE owns 99.9% of the bank).
4. Al Watani Bank of Egypt was acquired in 2007 by the National Bank of Kuwait to be National Bank of Kuwait-Egypt.
5. The license of four foreign banks was withdrawn by the CBE as they were not able to increase their capital.[9]
6. Other M&A reduced the number of banks from 63 (pre-reform) to 40.
7. Supervision shifted from compliance-based to a risk-focused approach (consists mainly of a capital adequacy ratio beside other fundamental prudential regulations) intending to "address essential relevant areas of risks such as credit and liquidity risks". It has also improved its management information system to ensure the quality and timeliness of required data.

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[5] Egyptian Official Journal, Issue No. 24, 15/06/2003 – Law no.88 of 2003; Law of the Central Bank, Amended by Law No. 162/2004 and Law No. 93/2005

[6] Egypt's constitution of 2014, Article 215.

[7] Basel III is implemented in Egypt under the name of Basel II Amendments.

[8] In September 2005, the Government announced that Banque du Caire would be incorporated into Banque Misr in a period of 6–18 months. Banque Misr has conducted a comprehensive study to deal with the BDC's problems. BM concluded that a merger between the two banks would adversely affect BM. Thus, the CBE decided in 2007 that BM acquire BDC instead of merging, in order to preserve the economic and legal entity of BDC and its management as one of the assets owned by BM.

[9] National Bank of Sudan, National Bank of Pakistan, Jammal Trust Bank (Lebanon), and Rafidain Bank (Iraq)

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In 2009, the CBE started the second phase of the reform program, the phase was supposed to have ended in 2011; however, due to the political situation representing in the Egyptian Revolution in January 2011, the program was extended to March 2012. This phase consisted of four basic pillars:

1. Restructuring public specialized banks financially and administratively.
2. Facilitate financial support and banking services for SME.
3. Following and evaluating the restructuring of the commercial banks in the first phase.
4. Applying Basel II regulations in the Egyptian banking sector.

Today, the Egyptian banking sector is composed of 38 banks,[10] all working under the supervision of the CBE, with a total number of 4220 branches covering all Egypt. Figure number A1 in the appendix shows the current structure of the banking sector in Egypt.

4. THE DEVELOPMENTS AFTER 2011: Lotus Revolution

In December 2010, a number of demonstrations broke out in Tunisia following the self-immolation of Mohamed Bouazizi. Thousands of Tunisians protested high unemployment and poor living conditions, as well as what they saw as a lack of social justice and worsening corruption within the regime. On January 14th 2011, Tunisian President Zine El Abidine Ben Ali was forced to step down from power and ask for asylum in Saudi Arabia.

The Tunisian Revolution, also referred to as the Jasmine Revolution, gave hope to many peoples from the Middle East and North Africa (MENA) that they could change the dictatorships that have governed for years. The success of the Tunisian revolution led many to believe that the power of the people lies in demonstration and going out into the streets and that the army could be a supportive force for the people and not a tool by the regime to suppress the people. Calls for protests and demonstrations soon filled the pages of Facebook, which sparked protests and demonstrations in many other MENA countries.

In Egypt, calls for demonstrations began on the eve of the success of the Tunisian Revolution, and 25 January, the Police National Day, was chosen as a day for demonstrations. The peaceful demonstrations began on Tuesday morning and evolved into a sit-in at Tahrir Square, the largest square in the Egyptian capital, Cairo; however, after midnight the police forcibly attempted to break up the peaceful sit-in. This led to further tension and more demonstrations and sit-ins the following day.

On 28 January, known as the Friday of Anger, the Egyptian government took a decision to cut off mobile and Internet services to avoid further demonstrations. After Friday prayers, hundreds of thousands in many Egyptian cities demonstrated against the Egyptian government and burned and besieged many National Democratic Party headquarters and police stations. By Friday's afternoon, the Ministry of Interior had completely lost control, especially in the governorates of Suez and Alexandria; this was followed by the withdrawal of police from police stations. A curfew was declared in Cairo, Alexandria, and Suez, and two hours later the curfew was extended to the whole of Egypt. The army then intervened to take responsibility for safety in the streets. This was the first time both for a country-wide curfew across Egypt and, since the Bread Uprising of 1977, for the army to be seen in streets in Egypt.[11]

According to the Egyptian Constitution, the President of the Republic is the Supreme Commander of the Armed Forces and chairs all meetings of the Supreme Council of the Armed Forces (SCAF). However, on Thursday, 10 February, the SCAF announced that it was in

[10] On 2 May 2019, the National Bank of Greece obtained an approval from the CBE to commence in the processes of ceasing operations in Egypt.

[11] In 1986, during the conscripts riot in Cairo, there was a curfew in areas of unrest in Cairo only. In contrast to what happened in 1977 when the army was on the people's side, the army was used in 1986 to crush the protesters who were described by the government as mutininous

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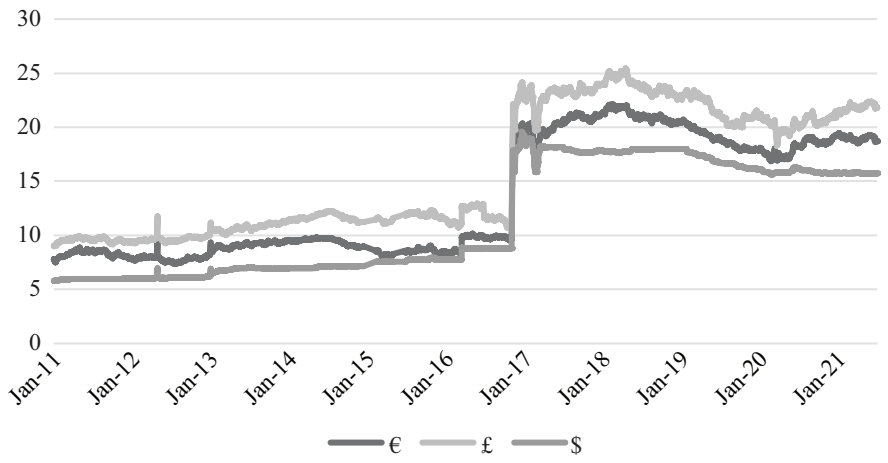
permanent session – something that had last occurred during the Yom Kippur War of 1973, and which normally happens only during wars – to discuss the latest developments. The meeting was chaired by the Egyptian Minister of Defense, Mohamed Tantawi; it was thus widely assumed that the army had already taken power in Egypt and let go of Mubarak.

On Friday, 11 February 2011, a statement was issued by the Presidency of the Republic declaring President Hosni Mubarak would step down as President and hand over the affairs of the country to the SCAF. According to the constitution, if the president cannot fulfil his responsibilities, a new temporary president of the parliament is to be announced and charged with preparing the country for an election. In this case, the constitution was totally ignored, and later officially suspended.

Following the revolution in 2011, the Egyptian economic and political situation faced a notable crisis where the foreign reserves fell significantly which led to a devaluation of the Egyptian pound to lose a large percentage of its value against the foreign currencies (figure number 1 shows the Euro, the British Sterling, and the American Dollar against the Egyptian Pound during the period (02/01/2011 – 30/06/2021). Moreover, Egypt faced high inflation rates after the revolution, reaching its highest value in November 2016, 5.333%, following the devaluation of the EGP on 3 November 2016; the lowest value was in September 2019 – 2.26%. The CBE calculates the core inflation index using the exclusion method by removing the direct effect of price movements in items that tend to exhibit undue volatility, not reflecting the persistent inflation pressure in the economy.[12] Figure number 2 shows the monthly inflation rate in Egypt during the period 2011–2021.

Figure 1
Main foreign currencies vs the EGP (Jan 2011 – June 2021).



Source: Self-preparation based on data from the CBE (www1).[13]

[12] Items excluded from the index are vegetables and fruits as they considered subject to price volatility (8.8% from of the CPI basket) and items with regulated prices by the Egyptian government (19.4% form the CPI basket) – there is no official list of these regulated items.

[13] On November 3, 2016, the CBE released the Egyptian pound to give flexibility to banks operating in Egypt to price the foreign exchange rate in order to restore its circulation within the legal channels and eliminate the parallel market of foreign exchange

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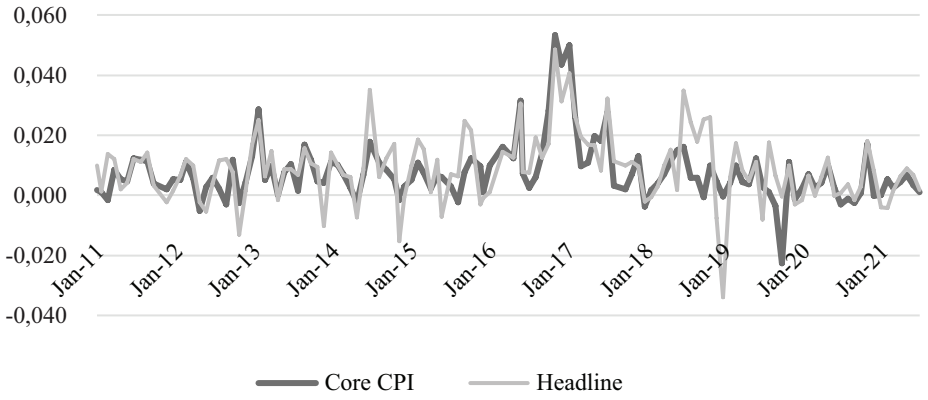
Figure 2
Monthly inflation rate in Egypt (Jan 2011 – June 2021)



Source: Based on data from the CBE (www1)[14]

The banking sector was not far from the crisis in Egypt; due to the decline in political and security stability which increased operational risks, the banking sector faced the exit of a number of major foreign banks working in Egypt. In addition, some of the other reasons for the exit of these banks were the poor financial situation of some of these banks and the change in their strategy, and the economic situation in the home countries of these banks.

In 2013, two French banks, the Société Générale and BNP Paribas, stopped their activities in Egypt, the Société Générale in Egypt was sold to QNB and BNP Paribas was sold to Emirates NBD. Followed by the National Bank of Oman (NBO) waiver of its license in 2014. In 2015, Arab African International Bank acquired the loans and deposits of the Canadian Bank of Nova Scotia. Commercial International Bank acquired Citibank's retail banking portfolio with $ 140 million in assets and $ 190 million in deposits. Al Ahli Bank of Kuwait acquired Greek's Piraeus Bank in Egypt in a deal worth $ 150 million to become Al Ahli Bank of Kuwait-Egypt. Last and not least was the British Barclays which was sold to the Moroccan Altijari Wafa Bank.

Despite all this, Egyptian banks maintained good performance during this period. At the end of the third quarter of 2015, the Egyptian banking sector ranked fourth among the Arab banking sectors in terms of asset size and ranked first among the banking sectors of the non-oil Arab countries (Union of Arab Banks, 2015). Figures 3.1, 3.2, and 3.3 show the aggregate financial position of banks (except CBE) starting from December 2010, 1 month before the revolution, ending by April 2021.

[14] Core CPI excludes from the headline CPI regulated items and the most volatile food items, namely fruits & vegetables.

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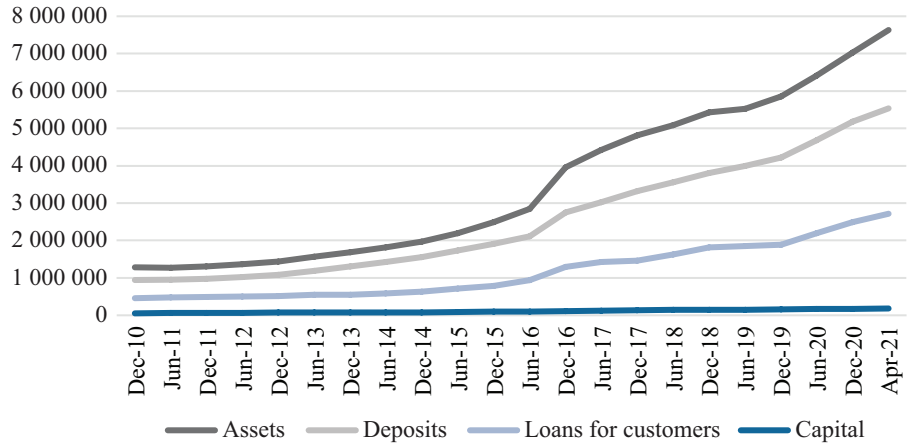
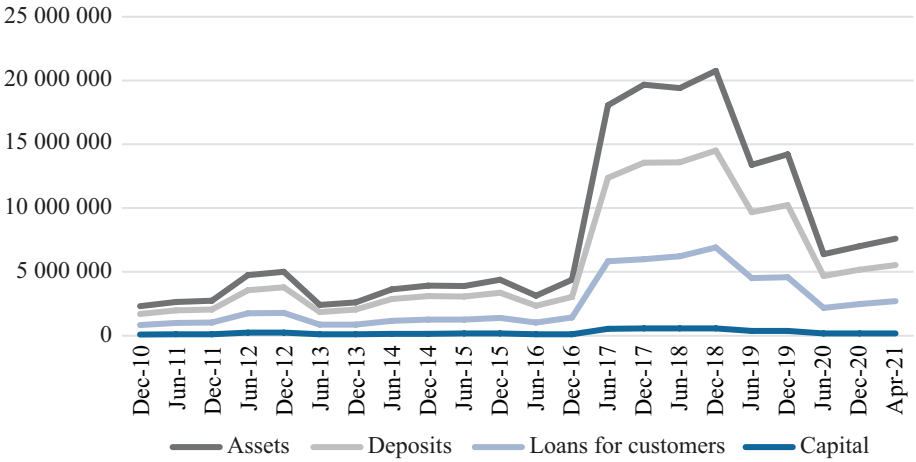
Figure 3.1
The aggregate financial position of Egyptian banks (except CBE) (Dec 2010–April 2021). Numbers by million EGP (Nominal Value)



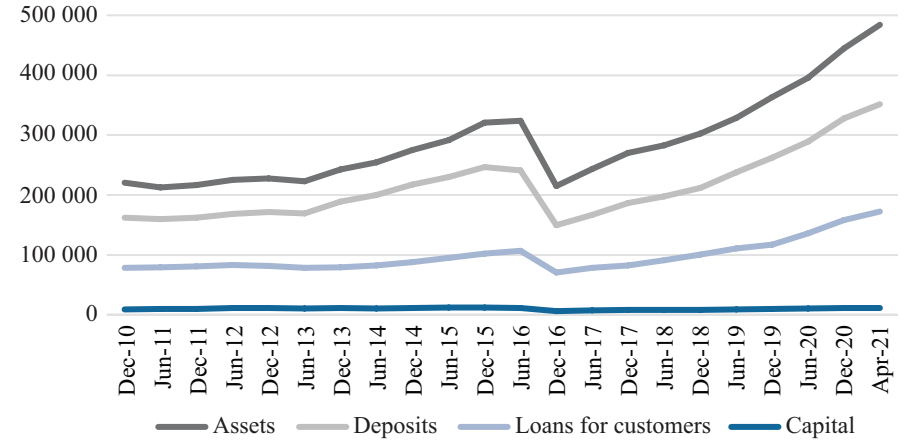
Source: Self-preparation based on data from the monthly statistical bulletin of the CBE (www1).

Figure 3.2
The aggregate financial position of Egyptian banks (except CBE) (Dec 2010–April 2021). Numbers by million EGP (Real Value)



Source: Self-preparation based on data from the monthly statistical bulletin of the CBE (www1).

Figure 3.3
The aggregate financial position of Egyptian banks (except CBE) (Dec 2010–April 2021). Numbers by million USD[15]



Source: Self-preparation based on data from the monthly statistical bulletin of the CBE (www1).

[15] Calculated according to the exchange rate on the date of publishing the monthly report.

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5. THE CURRENT STATE OF THE EGYPTIAN BANKING SECTOR

The Financial Soundness Indicators (FSIs) were developed by the International Monetary Fund (IMF) in order to support the analysis and assess the strengths and vulnerabilities of financial systems aiming to have financial stability presented into a robust financial system considering it as a must for economic development. The indicators can be divided into two main categories:

- Core indicators – based on the CAMELS framework (**C**apital adequacy, **A**ssets, **M**anagement capacity, **E**arnings, **L**iquidity, and **S**ensitivity to market risk).
- Additional indicators

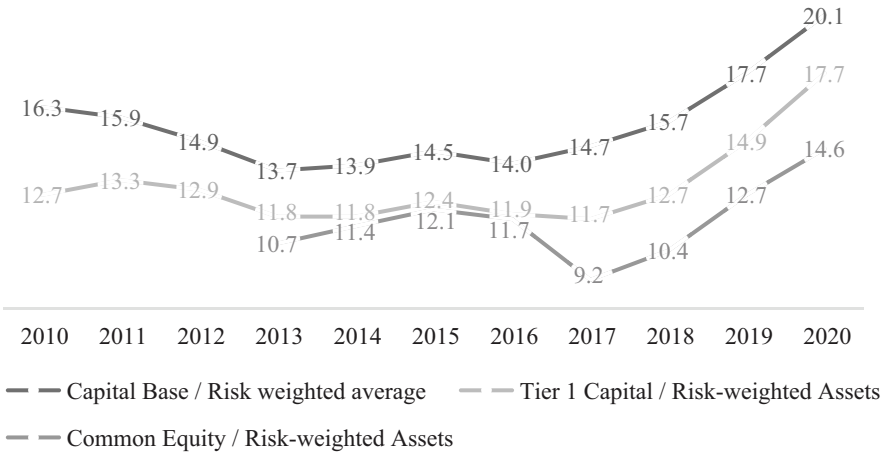
The CBE uses the four core indicators: Capital adequacy, Assets, Earnings, and Liquidity in analysing the Egyptian banking sector. Using these financial indicators is very important to evaluate the performance of a bank or a financial firm. Beaver (1966) was one of the firsts to use the financial ratios as predictors of failure and bankruptcy considering that ratio analysis provides useful information and helps to detect the financial illness to prevent firms from failing.

The Core Indicators are as follows:

1. Capital Adequacy measures the sufficiency of capital to support possible loses. Posner (2015) emphasizes that it measures the ability to withstand a financial loss and it "refers to the extent to which the assets of a bank exceed its liabilities". Acharya (2017) finds that capital adequacy is used to measure the systemic risk because "undercapitalized financial sectors lead to significant loss of economic output due to withdrawal of efficient intermediation services and possibly misallocation of resources". Alber (2013) considers it the milestone in the CAMEL approach as it "represents management quality and affects earnings, within capital adequacy and liquidity constraints".

   Within the framework of the implementation of the Basel standards, banks operating in Egypt – except for foreign banks – are required to maintain a minimum ratio of 11.25% for the capital base / the risk-weighted average in order to meet the risks of credit, market and operation. According to Mr Tarek Hassan Amer, the CBE governor, "all banks have complied with the minimum capital adequacy and precautionary standard of 11.25% except two banks which are followed by the CBE"[16]. Figure number 4 shows the evolution of capital adequacy from 2010 to 2020.

Figure 4
Capital adequacy indicators (2010–2020)



Source: Self-preparation based on data from the monthly statistical bulletin of the CBE (www1).

[16] The annual report 2016/2017, CBE.

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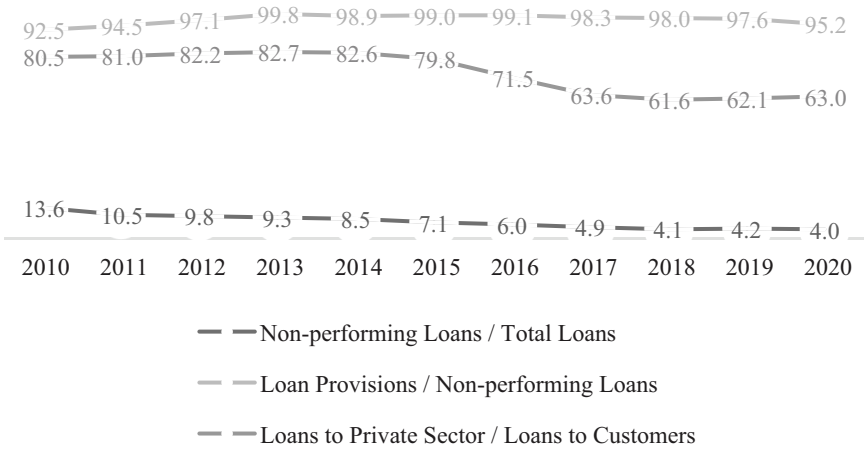
2. Asset Quality gives a "picture of the deposit-taker's asset composition, and show vulnerabilities in terms of potential losses from nonperforming loans and risks from lack of diversification" (Asian Development Bank, 2015).

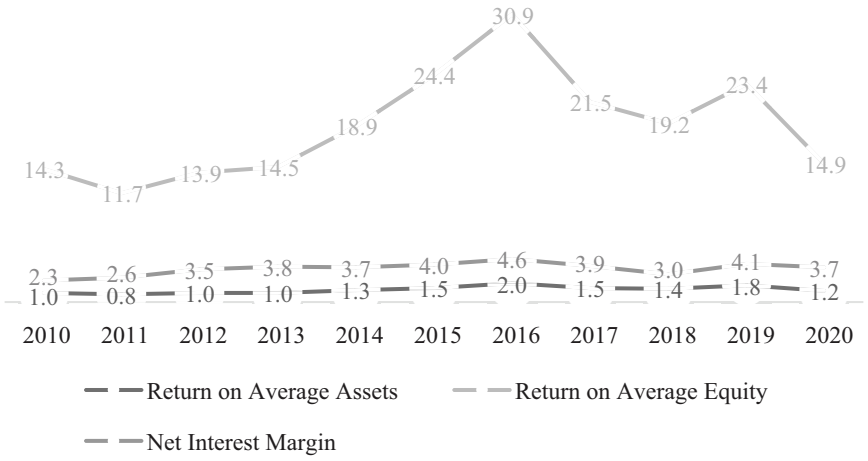
Figure 5
Asset Quality indicators (2010–2020)



Source: Self-preparation based on data from the monthly statistical bulletin of the CBE (www1).

3. A bank's earnings and profitability reflect its efficiency in using its assets and capital. Moreover, it measures the bank's ability to generate interest income.

Figure 6
Earnings indicators (2010–2020)



Source: Self-preparation based on data from the monthly statistical bulletin of the CBE (www1).

4. Liquidity is the ability to sell assets without having a change in its price, the indicators measuring the ability of the bank in meeting a sudden cash demand.

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Table 1
Liquidity indicators in the Egyptian banking sector, except CBE, (2010–2020)

Indicator (%)	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Average Liquidity Ratio											
Local Currency	44.7	55.6	58.4	61.8	62.7	59.7	55.4	47.1	40.3	44.4	53.8
Foreign Currencies	40.6	51.8	56.3	55.2	57.4	52.0	60.2	66.4	67.7	67.7	71.5
Securities / Assets	18.0	18.7	21.9	20.9	24.3	24.2	20.8	15.9	14.2	19.5	24.9
Deposits / Assets	81.0	82.5	82.7	83.6	84.6	84.0	79.6	72.6	74.9	77.4	78.6
Loans / Deposits:											
Total	51.8	50.2	48.1	44.1	40.8	40.9	47.0	46.0	46.2	46.7	46.4
Local Currency	44.0	45.7	45.8	40.2	36.2	34.5	39.9	39.4	39.9	40.1	42.3
Foreign Currencies	75.8	62.5	56.1	56.8	57.0	64.8	64.6	62.5	67.5	74.7	68.9

Source: Self-preparation based on data from the monthly statistical bulletin of the CBE (www1).

6. CONCLUSION

The development and performance of the financial sector present real indicators of economic stability in any country. The financial sector is based on two pillars, banks and stock exchange markets. Efficiency in the banking sector is an important topic because of the changing nature of competition and regulation. Berger and Mester (1997) find that efficient firms drive out the inefficient firms and keeping always an enduring level of inefficiency regards firms remaining in the market.

Despite the large number of literature on banking in developed, less developed and developing countries, there is a significant gap in the literature on the banking sector in Arab countries in general and in Egypt in particular. This study aimed to fulfil this gap in the literature by studying banking in Egypt during the post-revolution period. Although this era is very prosperous, the country also faced two phases of the Egyptian revolution, one in January 2011 against Mubarak's 30-year rule and another in June 2013 against the Islamists who came to rule after the first stage of the revolution. These two revolutions brought out many changes in the political and economic scene and drove the country into a crisis. The Egyptian exchange market (EGX) stopped working on 27 January 2011 two days after the demonstrations began, aiming to stop the bleeding losses. However, the first day of resumption of trading after 55 days, on 23 March, EGX lost about 37 billion EGP of its market value. By the end of 2011, the total losses reached 173 billion EGP (Al-Ahram, 2011; Al-Masry Al-youm, 2011; Akhbarak, 2018) (figure A3 in the appendix shows the main trading indicators for the EGX and figure A4 shows the turnover ratio).

Comparing between market-based systems and bank-based systems, Levine (2002) concludes that banks are doing a better job in mobilizing saving and identifying good investments, in particular, in weak institutional environments and early stages of economic development. Egypt's finance system is considered to be more bank-based than market-based. Although the EGX suffered heavily post-revolution, the Egyptian banking sector was able to work well during this period achieving high growth rates in most areas. By the end of the third quarter of 2015, the Egyptian banking sector ranked fourth among the Arab banking sectors in terms of asset size and ranked first among the banking sectors of the non-oil Arab countries.

The CBE in Egypt is like any other central bank – it is not only responsible for the national monetary policy, but also follows the "rules of the game," and determines the interest rates (Nell,

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1998). The financial position and the FSIs of the Egyptian banks after 2011 indicate financial safety and remarkable stability in the performance of Egyptian banks in spite of the difficult operating conditions in which these banks operate. During the post-revolution era, despite the turbulent economic and security situation in the country, large Egyptian banks have not seen a significant decline in their performance, which reflects solidity and resilience of the Egyptian banking sector in dealing with local, regional, and international changes.

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I would like to thank the Editor (Mrs. Małgorzata Olszak) and the two anonymous reviewers for the comments provided in relation to the earlier version of the paper. Finally, I would like to express my deepest gratitude to Prof. Ewa Miklaszewska for her comments on the first version of the paper. Any remaining errors are solely the author's responsibility.

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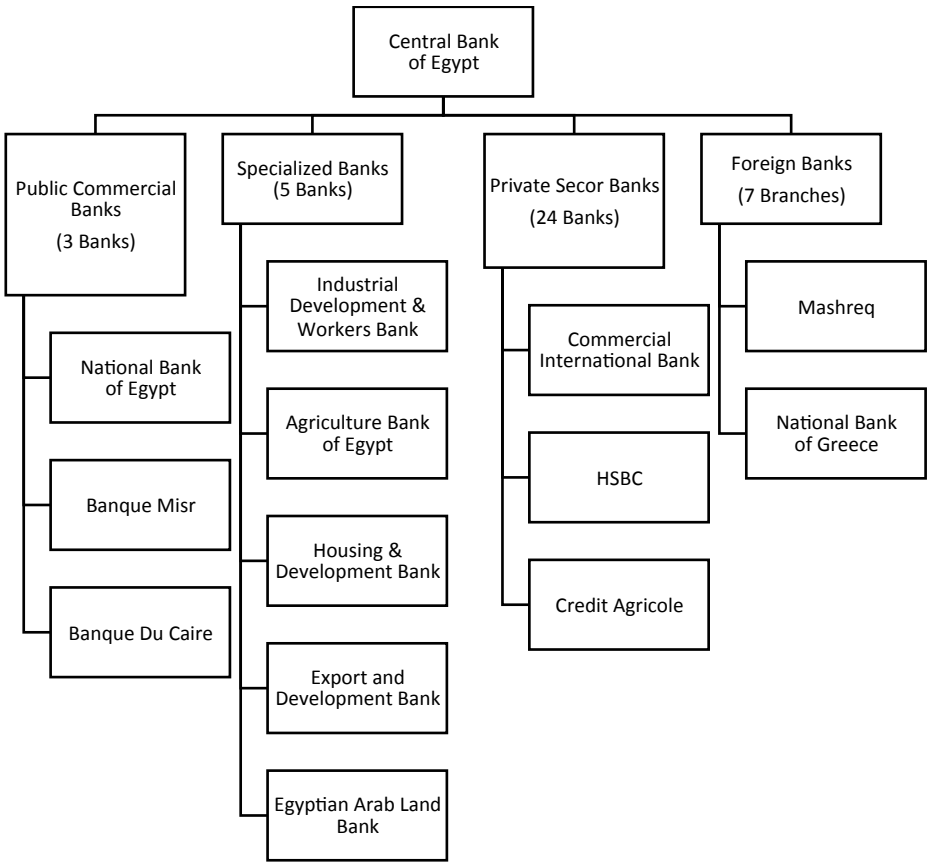
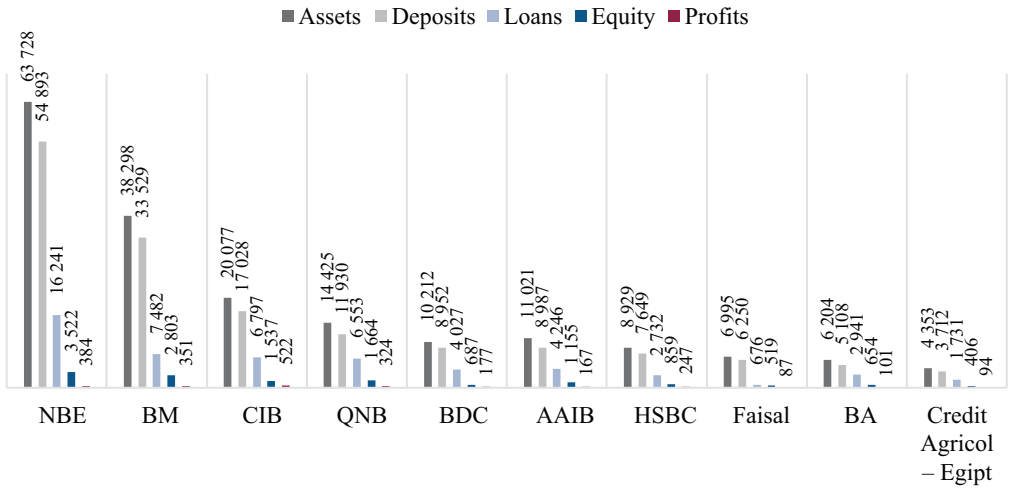
APPENDIX

Figure A1
The structure of the Egyptian banking sector (main banks)



Source: Self-preparation based on data drom CBE.

Figure A2
Data for the 10 largest Egyptian Banks in 2014 (numbers in million USD)



Source: Union of Arab Banks (2014).

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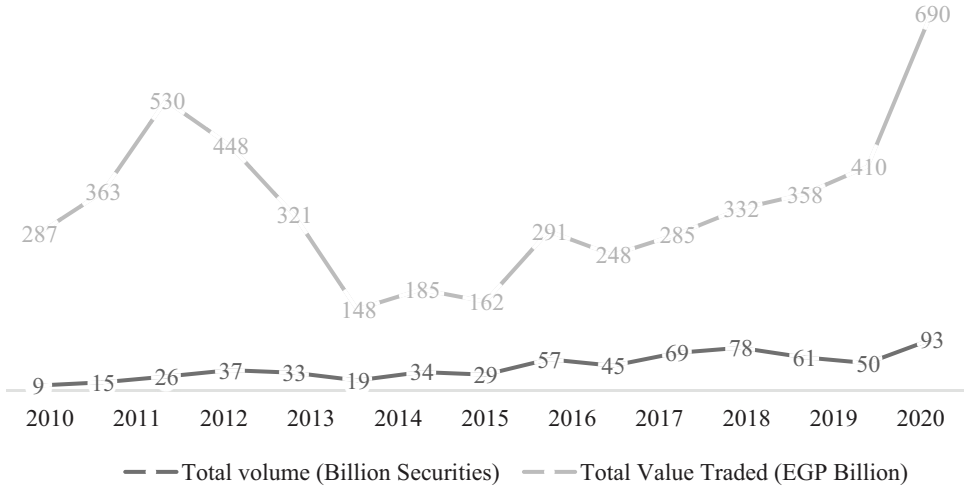
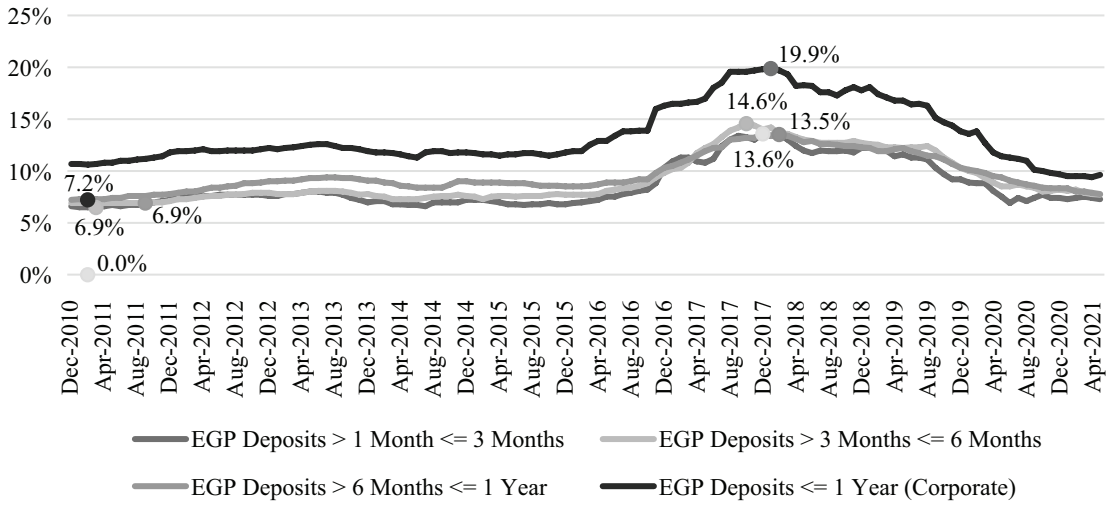
Figure A3
EGX main indicators (2006–2020)



Source: Self-preparation based on data from the annual reports of the EGX (2006–2020) (www2).

Figure A4
Weighted average of the interest rates in Egypt (Dec. 2010 – May 2021)



Source: Self-preparation based on data from the CBE (www1).

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Do Enhanced Collective Action Clauses Affect Sovereign Borrowing Costs?

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ABSTRACT

This paper analyzes the effects of including collective action clauses (CACs) and enhanced CACs in international (nondomestic law-governed) sovereign bonds on sovereigns' borrowing costs, using secondary-market bond yield spreads. Our findings indicate that inclusion of enhanced CACs, introduced in August 2014, is associated with lower borrowing costs for both noninvestment-grade and investment-grade issuers. These results suggest that market participants do not associate the use of CACs and enhanced CACs with borrowers' moral hazard, but instead consider their implied benefits of an orderly and efficient debt resolution process in case of restructuring.

EL Classification: E43; F32; F34; G12

Keywords: collective action clause, sovereign bond contractual clause, governing law, sovereign debt restructuring, default, bond spreads, sovereign cost of borrowing.

1. INTRODUCTION

The experience with the Argentina and Greece sovereign debt restructurings increased the pressure to strengthen the contractual framework and decisively address collective action problems in sovereign debt restructuring. In particular, Argentina had to make steep payments in 2016 after prolonged legal battles with creditors, when the New York court rulings ordered Argentina to make ratable payments to bondholders. The New York court rulings targeting Argentina's two previous debt exchanges (2005 and 2010) and this litigation could affect other similar cases depending on interpretations of specific contractual clauses under New York law and other governing laws.[1] [2]

[1] The extent to which these decisions will apply to future sovereign bonds is not clear. In litigation against Argentina in late 2016 and 2017 by holdout creditors, the Southern District Court of New York clarified that a sovereign's decision to pay some creditors but not others *in and of itself* did not give rise to a breach of the pari passu clause, and some other acts by the sovereign are necessary.

[2] The Financial Markets Law Committee (FMLC), an independent body of legal experts established by the Bank of England to examine issues of legal uncertainty in financial markets, has taken the view that the interpretation of the pari passu clause by the New York courts is unlikely to be followed by the English courts.

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As similar rulings could have profound consequences for future debt resolutions and ultimately for international financial stability, relevant contractual provisions in international sovereign bond contracts needed to be amended to ensure more orderly future debt restructurings. This could especially be the case for sovereign foreign debt restructurings that involve outstanding bonds without collective action clauses (CACs). As a result, in August 2014, the International Capital Market Association (ICMA) put forward recommendations relating to model enhanced CACs and a model pari passu clause for sovereign debt issuers that could facilitate a more efficient and orderly restructuring process. Subsequently, the IMF Executive Board endorsed the ICMA recommendations in October 2014 (IMF 2014).

In general, CACs allow for a supermajority of creditors to impose restructuring terms on minority holdout creditors. This contributes to an efficient resolution process, which typically reduces the cost of restructuring. These ex post benefits need to be contrasted with possible costs incurred from a CACs inclusion. As sovereign issuers are averse to ex ante increases in the cost of borrowing, CACs are frequently engaged in both policy and academic debates over whether they increase or lower the cost of borrowing. Proponents of CACs focus more on how they facilitate orderly restructurings and thus benefit both investors and borrowers, while skeptics argue that CACs increase the cost of borrowing as investors may consider that these clauses make restructurings easier and in turn compromise future bond returns. This latter moral hazard argument, which is based on the presumption that allowing countries to renegotiate and lower their debt obligations reinforces their profligate behavior, may imply higher yields required by creditors.

Empirical analysis can help determine the bond pricing impact of CACs and enhanced CACs. Previous studies have not provided clear conclusions, with their findings often being accompanied by significant data caveats (Bardozzetti and Dottori 2013, Fang 2015, Rath and others 2016, Stolper and Dougherty 2017, Carletti and others 2018, Picarelli and others 2019, Steffen and others 2019). This paper investigates the effect on bond pricing of CACs and enhanced CACs embedded in international sovereign bond contracts by analyzing a comprehensive set of secondary-market bond yield spread data and some stylized primary-market yield observations.

Our study sheds some light on the yield behavior of bonds adopting CACs and enhanced CACs and consequently on the sovereign cost of borrowing, which is a crucial determinant of new sovereign debt issuances. Also, we examine yield developments at times of debt distress that play a crucial role in debt restructurings and relating exchanges. The main innovation of this study is the undertaking of a systematic examination of the sovereign bond pricing impact of the inclusion of the ICMA's 2014 model of enhanced CACs using a comprehensive set of secondary-market sovereign bond yield spread data. While primary-market data allow the assessment of the actual cost of sovereign borrowing at issuance, secondary-market data allow the analysis of the pricing of traded bonds, with and without enhanced CACs, at particular points in time, including times of distress.

By employing primarily emerging-market economies' bond yield spreads over a relatively long period (May 1996–March 2020), the objective of our study is to provide a thorough understanding of the bond pricing behavior and impact of CACs. Our findings allow to better qualify the IMF Progress Reports' remarks that inclusion of enhanced CACs doesn't seem to have an observable pricing effect (IMF 2019).[3] Using secondary-market bond yield spreads, we find that inclusion of regular CACs is associated with lower costs most of the time, while the inclusion of enhanced CACs is associated with lower spreads since the introduction of this clause in August 2014. These results suggest that market participants do not associate the use of CACs and enhanced CACs with borrowers' moral hazard, but rather take into consideration their implied benefits of an orderly and efficient process in case of restructuring.

[3] Stolper and Dougherty (2017) argue along the same lines.

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The remainder of the paper is organized as follows: Section II provides a brief review of the literature on the cost of including CACs. An overview of the evolution of CACs and the current status of international sovereign bonds are presented in Section III. Sections IV and V discuss the findings of our empirical analysis for different historical periods. Finally, Section VI concludes by offering some insights into interpreting our findings.

2. BRIEF LITERATURE REVIEW

Several studies have dealt with the cost aspects of CACs, without consistent empirical findings on the market impact of the inclusion of CACs on bond yields. Public debt managers and market participants contend that it is difficult to assess the absolute impact of specific contractual provisions, given that there are many nonlegal factors impacting bond prices. Such factors include geopolitical risks, the government's negotiating capacity, the likelihood of a bailout by international financial institutions, liquidity conditions, the structure of the investor base, investor relations, credit ratings, and haircut ratios from previous debt exchanges.

There are broadly two opposing views on the cost impact of the inclusion of CACs, namely that inclusion of CACs leads to higher yields or to lower yields of sovereign debt securities. Proponents of the view that CACs are associated with a higher cost of borrowing argue that inclusion of CACs would make it easier for sovereign debtors to restructure their debts, thus effectively decreasing creditors' returns if they come to default. Specifically, they argue that the use of CACs would encourage over-borrowing and would be an easy way out of defaults. In this context, it would promote debtors' moral hazard and, as CACs would increase the chances that investors would take losses, investors would want to be compensated ex ante for the added risk with a higher market yield (Eichengreen and Mody 2000, Häseler 2009, De Grauwe 2011, Carletti and others 2018, Ratha and others 2016).

The opposing view argues that inclusion of CACs in bond contracts would make restructurings more orderly and efficient, leading to fewer holdout-creditor problems and less time involvement of creditors in debt resolutions and in turn to the faster economic recovery of distressed countries through quicker international market access and higher trade (Gugiatti and Richards 2003, Bradley and Gulati 2013, Fang and others 2019). In particular, Fang and others (2019) find that CACs help reduce holdout rates, especially for high-haircut debt restructurings. Also, their simulations demonstrate that only the strongest single-limb CACs minimize holdout and litigation risks. In turn, faster economic recovery would lead to a higher expected return on investment in the long run. Therefore, CACs should in principle lower the cost of borrowing and reduce the overall long-term economic risk. Further, other recent empirical studies on the bond pricing impact of CACs inclusion have argued about no discernable CAC-related bond price effects (Stolper and Dougherty 2017) or some possible effects for the euro area (Carletti and others 2018, Picarelli and others 2019, Steffen and others 2019).

As empirical studies on the implied cost of borrowing from the inclusion of CACs in bond contracts have been inconclusive so far, this fundamental question remains practically unsettled. We present below some findings of previous studies analyzing the bond-pricing effects of CACs for different investment-grade sovereign debt securities and for periods of debt distress for individual sovereigns.

2.1. Differences in Bond Pricing by Credit Rating

Several studies have looked into specific scenarios to find out how inclusion of CACs would affect the cost of borrowing for countries with different credit ratings. Becker and others (2003) examined the impact of CACs on both primary- and secondary-market bond yields for emerging

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market issuances on two particular time horizons, capturing the pre- and post-Russian crisis periods. In contrast to the results of Eichengreen and Mody (2004), Becker and others (2003) found no evidence that the presence of CACs had increased borrowing costs, regardless of the issuers' rating. Gugiatti and Richards (2003) found no impact of the inclusion of CACs on yields in several emerging markets (low-rated countries).

Bardozzetti and Dottori (2013), using cross-section, secondary-market yield time-series data, found that CACs have little impact on the cost of borrowing for sovereign issuers with high (AAA to BBB-) and low (B+ to the lowest) credit ratings, but generally reduce the cost for mid-rated issuers (BB+ to B+), as these countries can benefit the most from an orderly restructuring. They argue that since there is a low probability for high-rated countries to default, there would be no impact from including CACs for them. Further, since moral hazard concerns are prevalent for low-rated countries, the cost-reducing impact of CACs is at least partially offset by the higher risk premium. Different from these findings, Bradley and Gulati (2013) found that the inclusion of CACs in a sovereign bond contract was associated with a lower borrowing cost, especially for financially weak issuers, due to expectations of an orderly restructuring process and a speedier economic recovery.

2.2. Differences in Bond Pricing during Crises

Other studies focus on looking at how the inclusion of CACs would affect the cost of borrowing differently during a time of distress versus normalcy (Annex II, Table A2). Carletti and others (2016) studied Venezuela's secondary-market yield changes during distress. Using cross-section time series panel regressions, they found that the bonds with no CACs that required a 100 percent vote to modify the term (more difficult to restructure and cut returns) were cheaper than bonds with CACs that required a 75 percent and 85 percent vote during the distressed period of 2010–16. However, the inclusion of CACs in Venezuela's bonds was positively associated with the secondary-market yields during near-default situations (for an example of period, the probability of default was over 90 percent in June 2016). Further, Gugiatti and Richards (2003) found no observable pricing differences of sovereign borrowers who switch between the use and nonuse of CACs in their bond issuance. Their empirical evidence shows that even after the intense debate about sovereign debt restructurings through 2002, the inclusion or absence of CACs still had no economically or statistically significant impact on yields as of early 2003.

3. AN OVERVIEW OF COLLECTIVE ACTION CLAUSES

This section presents the broad rationale and evolution of CACs in international sovereign bond contracts. CACs exist in various forms, with the main intent being to allow a qualifying majority of bondholders to agree to the restructuring terms on their bonds and to make these changes binding on dissenting creditors (holdouts). In this sense, CACs are a tool to facilitate sovereign debt restructuring and, at the same time, to make the investors (financial institutions) share the cost of financial distress of borrowers to reduce the country's taxpayers' burden. This complex nature of sovereign-bond CACs makes it difficult to analyze how the inclusion of CACs is priced in financial markets, reflecting different parties' interests.

The variety of CACs forms relates to their history (Table 1). Sovereign debt issuances prior to 2003 under New York law did not generally include such clauses, while CACs that allow collectively binding restructuring decisions have traditionally been included in sovereign bonds governed by English law. A wide use of CACs started with Mexico in February 2003, with the inclusion of CACs being the market practice for New York-law-governed bonds since then.

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Although a 75 percent majority of votes required is the typical form of CACs, "required votes" to change the terms varies from 18.75 to 85 percent of the outstanding bondholders (Bradley and Gulati 2013)[4].

In October 2010, the Eurozone had initiated the inclusion of standardized "double-limb" aggregation Euro CACs in all new euro area government bonds (domestic and foreign law-governed bonds) with a maturity above one year, starting from January 1, 2013. This double-limb aggregated voting structure requires that a minimum threshold of support be achieved both (1) across all series being restructured (75 percent); and (2) in each series (66.67 percent). If an individual series does not meet the 66.67 percent requirement, it is excluded from the restructuring while others that meet the requirement are included. The key advantage of this approach, relative to the traditional series-by-series CAC, is that the minimum level of support needed from each series is lowered from (the typical) 75 percent of outstanding principle to 66.67 percent of outstanding principal, thereby making it more difficult for holdout creditors to obtain a blocking position in a particular issue. While double-limb aggregation clauses in sovereign bonds were a welcome development, they still allow holdouts to control an issue and would not address the collective action problems as effectively as single-limb aggregation.

Further, the ICMA recommended enhanced CACs in August 2014 and a new standard pari passu clause for inclusion in sovereign debt securities, which were endorsed by the IMF in October 2014. A single limb voting procedure enables bonds to be restructured based on a single vote across all instruments or a subset of instruments, thereby preventing a creditor or a group of creditors from holdouts in a particular series and in turn from nullifying the operation of CACs in that series. While issuances that incorporate the enhanced CACs include the key features of the ICMA proposals,[5] the formulation of the clauses has evolved to suit specific needs and market preferences in various ways.

In November 2018, the Eurogroup announced broad support among euro area finance ministers to amend the European Stability Mechanism (ESM) treaty to require single-limb CACs in all euro area issuances by 2022. Currently, the ESM treaty requires the inclusion of double-limb CACs in all issuances by euro area members. The inclusion of single-limb CACs would be a significant development in harmonizing market practice around the world.

At present, a substantial proportion of outstanding international sovereign bonds incorporates various forms of CACs[6]. As of March 2020, it is estimated that of the approximately $1.3 trillion foreign law-governed sovereign bonds outstanding, approximately 46 percent is governed by English law and approximately 52 percent by New York law (Figures 1 and 2). Approximately 51 percent of the outstanding stock includes the ICMA's enhanced CACs, while 45 percent of the outstanding stock has two-limb aggregated or series-by-series CACs (old forms of CACs), and 4 percent did not include any CACs. Out of outstanding bonds without any CACs, about 44 percent is below investment-grade and more exposed to disadvantageous interpretation at the court in case of restructuring. Outstanding bonds without CACs would not mature until 2096, and 75 percent of them are under New York law. The pari passu clause, which states that the bond debt will be ranked equally, could be found virtually in every international sovereign debt contract, and about 50 percent of outstanding stock includes the ICMA's strengthened pari passu clause.[7]

[4] The 18.75 percent vote typically is applied only if an initial quorum requirement is not satisfied.

[5] The key features of the ICMA model single-limb clauses include: (1) a "uniformly applicable" requirement in a single-limb voting procedure; (2) a 75 percent aggregate voting requirement; and (3) sub-aggregation.

[6] The share of outstanding stock is calculated based on the outstanding amount in US dollars as of end-March 2019. The most recent official estimate is based on data used in the IMF's Fourth Progress Report on Inclusion of Enhanced Contractual Provisions in International Sovereign Bond Contracts (2019).

[7] This figure is based on the Bloomberg, Dealogic, Perfect Information database, and various countries' authorities. This excludes GDP warrants and China's domestic issuances under Hong Kong SAR governing law.

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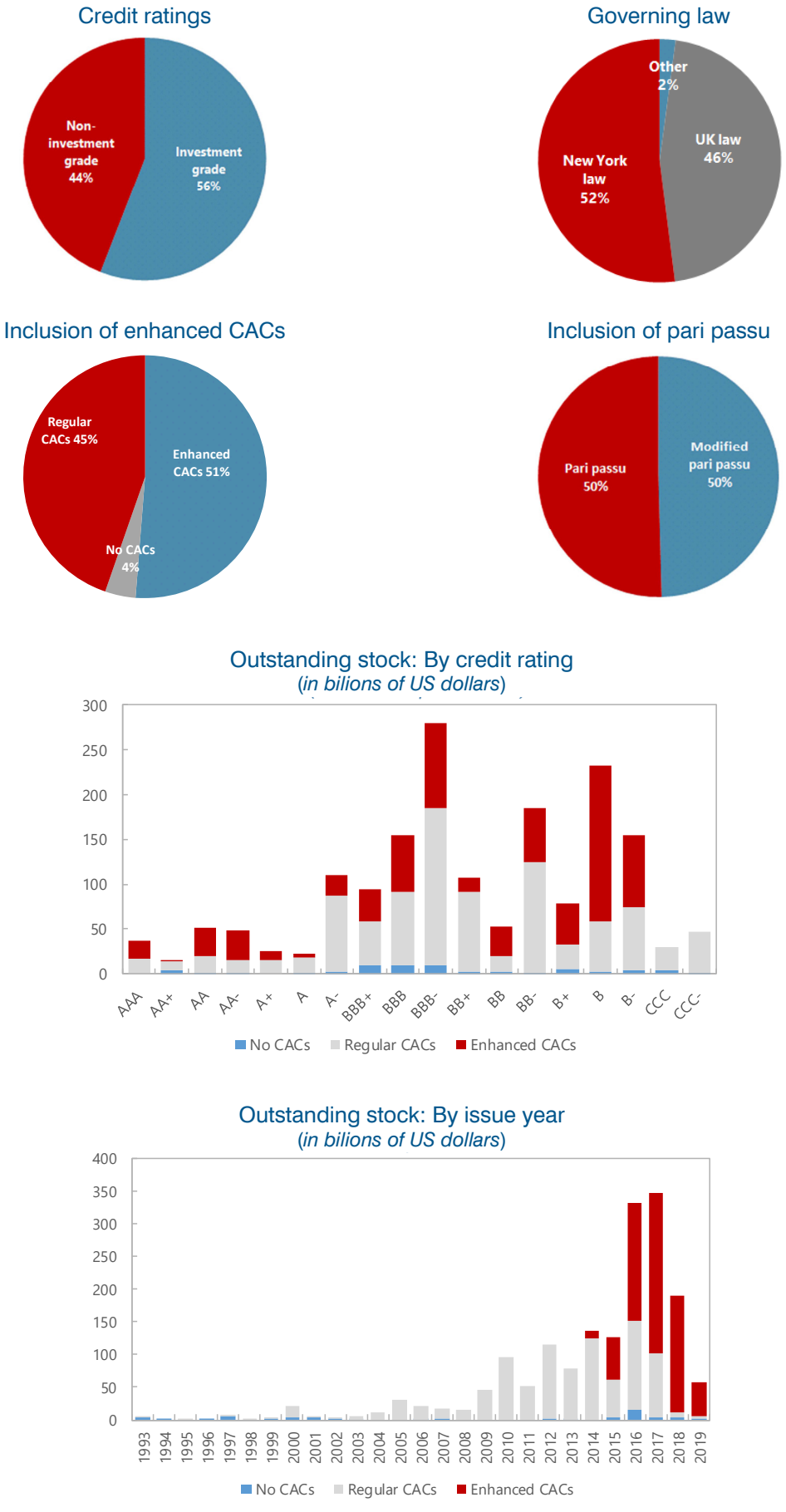
Figure 1
Foreign Law-Governed Sovereign Bonds: Overview (as of end-March 2020)



Sources: Perfect Information database and IMF staff calculations.

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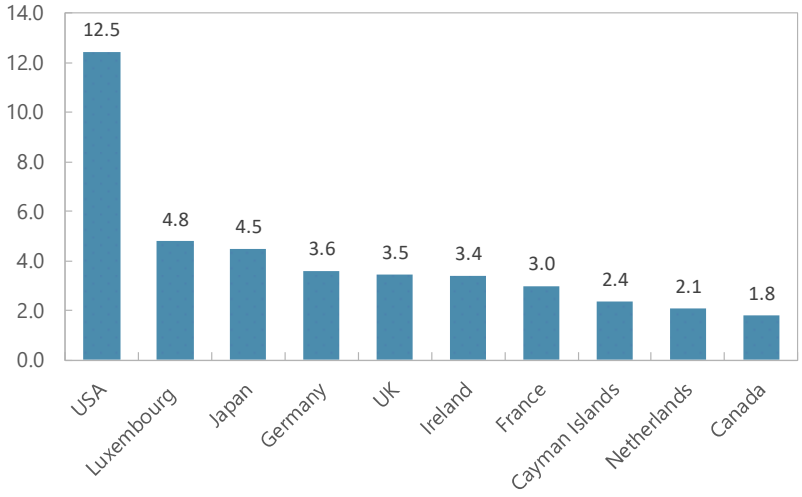
Figure 2
Total International Portfolio Investment Assets (in trillions of US dollars; as of June 2019)



Sources: Coordinated Portfolio Investment Survey and IMF.

Table 1
CACs and the Recent European Sovereign Debt Crisis

Year	Month	Region	Event
2003	**Feb.**	**Global**	**U.S. Treasury initiative to include CACs in bonds issued under New York Law**
	Apr.	**Euro area**	**EU members decide to include CACs in the international debt issuance**
	Sep.	**Euro area**	**The EU Economic and Finance Committee agreed on a set of core CACs to be voluntarily included in the documentation accompanying the debt issuance**
2007	June	USA	Subprime mortgage crisis begins; Bear Stearns falls
		USA	Lehman Brothers files for bankruptcy-court protection
2009	Oct.	Greece	New Greek government announces that earlier fiscal data had been misreported
2010	May	Greece	First economic adjustment and financial assistance program for Greece, financed by European Financial Stability Facility (EFSF) and the IMF
	Oct.	Euro area	Deauville agreement that euro-area sovereign bailouts would require losses be imposed on private creditors
	Oct.	**Euro area**	**German government makes the first proposal to introduce CACs at European Council meeting**
	Dec.	Ireland	European Financial Stabilization Mechanism (EFSM)/EFSF and the IMF economic adjustment and financial assistance program was agreed
2011	**Mar.**	**Euro area**	**Eurozone countries decided at the March 24–25, 2011, European Council meeting to include two-limb CACs in all new euro-area sovereign bonds with a more-than-one year maturity, issued after July 2013**
	May	Portugal	EFSM/EFSF and the IMF economic adjustment and financial assistance program was agreed

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Year	Month	Region	Event
2012	Mar.	Greece	Second program was signed with the European Commission on behalf of the Eurogroup, the ECB and the IMF, with funding to be provided by EFSF and the IMF
	Mar.	**Greece**	**Yield on Greek 10-year bonds peaks at 33.7%; restructuring of sovereign bonds held by private sector (PSI) by retrofitting CACs (83.5% participation rate; 53.5% haircut)**
	Jul.	Euro area	ECB President Mario Draghi's statement of "whatever it takes to preserve the euro" leads to significantly lower bond yields of weak euro-area countries
	Sep.	**Euro area**	**Introduction in the European Stability Mechanism Treaty (Article 12(3)) of CACs for euro-area sovereign bonds issued after January 2013 ("euro-area model CAC 2012")**
	Nov.	Greece	Reduction and deferral of Greece's interest payments, extension of loan maturities and signals for additional debt relief
2013	Jan.	Portugal	Portugal returns to bond markets
	Jan.	**Euro area**	**Two-limb CACs become mandatory for euro-area members' sovereign bond issuances**
	Dec.	Ireland	Conclusion of EFSM/EFSF program
		Portugal	Portugal returns to economic growth after three years
2014	Apr.	Greece	Greece returns to bond markets, with issuance for the first time in four years
	May	Portugal	Conclusion of EFSM/EFSF program
	Aug.	**World**	**International Capital Market Association (ICMA) introduces enhanced CACs and strengthened pari passu clauses, and IMF Executive Board endorses them**
		Ireland	Ireland achieves highest GDP growth in EU
2015	Jun.	Greece	Second program funded by EFSF expires on June 30
	Jul.	Greece	EFSM provides short-term bridge loan (€7 billion) to meet immediate commitments, including loan repayments to the ECB and IMF – loan was repaid on August 15
	Aug.	Greece	Third program was approved by European Stability Mechanism (ESM) Board of Governors, with ESM making its first loan disbursement of €13 billion
	Dec.	Greece	As part of the third program, ESM provides €5.4 billion for recapitalization of the Piraeus and NBG banks
2018	Aug.	Greece	Conclusion of third program with ESM on August 20
	Dec.	**Euro area**	**The Eurogroup announces that ESM members will pursue single-limb CACs in newly issued euro-area sovereign bonds and will introduce them by January 2022**
2019	**Jun.**	**Euro area**	**The Eurogroup, at its June 14 meeting, introduces single-limb CACs in the draft revised text of the ESM Treaty**
	Dec.	**Euro area**	**The Eurogroup, at its December 4 meeting, agrees in principle, subject to national procedures, on the elements related to the ESM Reform**

Sources: European Financial Stability Facility, European Stability Mechanism, International Capital Market Association, and other various sites.

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4. EFFECTS OF CACS ON SECONDARY-MARKET YIELDS

Below, we provide empirical evidence on the effects of the inclusion of CACs and enhanced CACs on the yield spreads of foreign law-governed sovereign bonds traded in secondary markets. The most significant benefit of using secondary-market yield data is the ability to analyze the evolution of the same bond with enhanced CACs (or without CACs) during normal and crisis times (that is, in a sovereign debt crisis period). By controlling bond characteristics (coupon, tranche size, currency, original maturity, governing law) and time-variant financial-market variables (changes in credit ratings, remaining maturities, bid-ask spread as a liquidity indicator, the Volatility Index (VIX), credit default swap (CDS) spread, inflation, exchange rates, debt-to-GDP ratio, GDP growth rate), we try to shed light on how investors value bonds with and without CACs during times of an imminent potential debt restructuring or other immediate debt-distress concerns.

In addition to the examination of the pricing impact of regular CACs, this study systematically looks at the pricing impact of enhanced CACs since ICMA introduced them in August 2014. Market participants have frequently asserted that investors are relatively less concerned about CACs in normal times or when they buy a bond at issuance, but they start to focus on the existence of CACs and are likely to value the bond differently at times of debt distress. A way to properly identify such market changes is to examine the evolution of secondary-market yields. Some studies also argue that using secondary-market spread minimizes potential endogeneity problems and makes it easier to analyze market perceptions of bonds during specific times, for example, before Russia's distress versus after distress, and before and after the euro sovereign bond crisis.

4.1. Data

First, we use a sample of advanced economies and emerging markets' foreign law-governed sovereign bonds that were outstanding at the end of March 2020. Secondary-market bond yields were available for 1,025 bonds, omitting bonds with a remaining maturity of less than one year because they tend not to be actively traded and thus result in yields that are not representative of price discovery. Also, we use bonds with secondary-market bond yields for mostly conventional-type bonds with a fixed rate, bullet payment, or simple coupon payment structure, not including bonds with complex coupon payment structures, convertibles, or variable rates. Our sample of outstanding bonded debt consisted of 4 percent bonds with no CACs, 45 percent with regular CACs, and 51 percent with enhanced CACs.

For the dependent variable, we use sovereign bond yield spread (over respective benchmarks) data (in basis points) based on actual price quotes from dealers in the market.[8] Mid-yields to maturity are calculated as a simple average of daily series, then spreads are calculated using as benchmarks the relevant bond yields of the respective currencies of issuance. Sovereign spreads can be interpreted as the expected loss from default and a risk premium, with the latter reflecting investors' price of the risk of unexpected losses (Remolona, 2007). For the independent variables in our analysis, we use Bloomberg data and the IMF World Economic Outlook (WEO) database for individual bond-specific characteristics (for example, coupon, maturity, tranche volume in billions of US dollars, issue currency, stock exchange, governing law, SEC registration, monetary union, and emerging-market identification), while we use other time-variant market data from Bloomberg for time series of credit ratings, GDP growth rate, debt-to-GDP ratio, the VIX, individual country CDSs, inflation, and exchange rates. Emerging markets are broadly defined, including frontier markets and low-income countries.

[8] Primary pricing sources were BVAL and CBBT. If these were not available, we used generic Bloomberg pricing source BGN or others.

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Information on inclusion of CACs is fine-tuned to encourage better understanding; namely, we use the binary variable for no CACs (1 or 0), CACs (1 or 0), and the new, enhanced CACs (1 or 0), as the three alternatives are mutually exclusive. As for countries' credit ratings, we use time series of S&P's long-term foreign currency sovereign bond credit ratings (complemented by Moody's and Fitch ratings data), converting into numeric values, with the "lower the grade, the larger the numbers" (in Annex II, Table A1, for example, AAA is coded 1, while C is coded 24). Regarding remaining maturities, they are calculated as the time remaining (in years) each month from the original maturities.

Further, we use the Perfect Information database for bond contract information, and Bloomberg and Dealogic for bond market data. From the Bloomberg and Dealogic databases, we obtain all bond market characteristics, including yields at issuance and market yield-to-maturity time series (monthly average series). From the Perfect Information database, we obtain all bond legal characteristics, including various forms of CACs, enhanced CACs, and pari passu and strengthened pari passu clauses. Thorough data indexing developed for each legal clause is a novelty of this study, since this level of detail has not been documented or used before. Many existing studies use the governing law (New York law-governed bonds as not including CACs versus English law-governed bonds as including CACs) as a proxy, while our study's level of CACs specification provides more accurate analysis on market pricing.

For the purpose of this study, we look at foreign law-governed sovereign bonds, with the majority issued in foreign currency. Our sample includes advanced economies' bonds (that is, Austrian, Finnish, and Swedish sovereign bonds under English law) and emerging markets' sovereign bonds, which represent over 90 percent of the sample. We treat central bank bonds issued to finance the sovereign balance sheet as equivalent to government bonds issued by the ministry of finance. We do not include state-owned enterprise bonds or government guaranteed bonds. Further, we include sukuk (Islamic bonds) issued in international markets, using their regular daily yields.

This study expands the existing literature, not only because it uses a novel data set, but also because it provides a systematic analysis of the effects of inclusion of CACs and enhanced CACs on secondary-market bond yields. So far, studies have looked at specific bond markets (for example, emerging markets, Eurozone, Venezuela, and so on), specific time periods (at bond issuance, the Eurozone sovereign debt crisis, or the near-default situation in Venezuela), certain issuing currency (US dollars, euros), or certain governing laws (English law, New York law). Our analysis uses such a comprehensive data sample, covering 287 time-points (monthly series) of 1,025 outstanding bonds from 116 countries for all regions (advanced economies and emerging markets), issuing currencies, governing laws, stock exchanges, time-variant variables like bond market liquidity, credit ratings, and remaining maturities, and various macroeconomic indicators.

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Table 2
Descriptive Statistics of Main Regression Variables

Variables	Mean	Median	Max	Min	Std. Dev.	Skewness	Kurtosis
Spread	543.0	250.4	8,100.0	-	-	125.6	157.8
Yield	5.9	4.8	81.3	1.0	-	125.6	157.0
Coupon	4.7	4.5	12.8	-	2.2	0.2	2.8
Outstanding _$	1.3	1.3	5.9	-	0.9	0.9	4.9
BID	0.8	0.4	100.0	-	3.2	23.3	646.4
CDS	272.0	128.9	5,975.5	33.8	536.7	6.3	49.0
SEC	0.3	-	1.0	-	0.5	0.8	1.7
VIX	18.3	15.5	62.6	10.1	8.8	2.5	10.6
CPI	5.0	3.4	34.1	-	4.9	1.3	9.6
Debt	46.1	46.4	103.0	11.9	18.5	0.4	2.6
EMBI	345.9	237.0	3,831.0	46.0	393.7	4.7	30.9
EXR	3,044.0	50.7	23,256.5	1.0	5,523.3	1.5	3.6
Issue	2013	2014	2021	1993	5	0	6
Mature	2031	2026	2117	2020	14	4	21
Remaining _Mat	12.3	8.1	99.7	-	13.5	3.9	24.1
Orig_Mat	17.8	10.3	100.1	3.0	14.9	3.2	18.1
Rating	10.5	9.0	21.0	3.0	3.9	1.5	4.9

Note: BID denotes bid-ask spread. Outstanding$ denotes outstanding amount in billions of U.S. dollars.
CDS denotes five-year credit default swap spread.
Spreads denote each bond yields over 10-year US government treasury, German bund, Japanese government bond yields in bps, corresponding to each bond's issuing currency.

4.2. Methodology

We use a panel regression model with the sovereign bond yield spread (in basis points) as the dependent variable and the variables discussed above as independent variables. (We also ran the same model with the mid-yield to maturity as the dependent variable, but no significant difference was observed in our findings.) Our analysis uses a monthly series from May 1996 to March 2020, a monthly series of a simple average of daily sovereign bond yield spreads, partly to avoid a noise from daily-yield volatility.[9] For estimating the impact of different types of CACs, we use a binary dummy variable for no CACs, regular CACs, and enhanced CACs (since August 2014, when the ICMA's enhanced CACs became available). Our proposed model for the empirical analysis has the following specification:

$$Yi,t, = \alpha + \beta_1 CAC + \beta_2 CAC\_ENHANCED + \beta_3 Xi,t, + \beta_4 \theta i, + \varepsilon i,t,$$

where $Yi,t,$ is the sovereign yield spread for bond i during month t, $Xi,t,$ is a vector of time-variant variables, and $\theta i,$ is a bond-specific time invariant effect.

[9] To obtain meaningful results, we exclude spreads over 1,000 since bonds with spreads over 1,000 tend to have weak price discovery due to, e.g., limited liquidity. Bonds with remaining maturity of less than 12 month are excluded due to the limited trading activity and liquidity.

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Our approach uses a rudimentary equation that fits the data well for the whole sample, and, when we break the sample, we omit any variable if we encounter a near singular matrix or an error. Notably, the model using the whole sample with the best fit could contain most of the control variables, so we didn't need to omit too many variables to get a meaningful analysis for each time period.

The vector *Xi,t,* includes variables common to all bonds, as well as bond-specific variables (coupon, tranche volume in billions of US dollars, tenor, governing law as binary variables, with definitions of the explanatory variables being provided in Annex I. Time-variant variables include: (1) inflation in annual percent changes; (2) sovereign five-year CDSs; (3) changes in the numeric value of credit ratings (foreign currency long-term); (4) remaining maturities at the end of each month; (5) bid-ask spreads; (6) the VIX; (7) exchange rates; (8) debt to GDP ratios; and (9) emerging markets bond index (EMBI) spreads.

We divide bonds into three CACs groups: no CACs (1, 0 otherwise); inclusion of regular CACs (1, 0 otherwise); and inclusion of enhanced CACs (1, 0 otherwise). By using two variables in an equation, regular CACs and enhanced CACs, the coefficient is interpreted as the difference of spreads (increase or decrease) compared to the absence of CACs. For example, if the regular CACs' coefficient is -40, this means the yield of bonds with the CACs is 40 basis points lower than bonds without CACs.

Given that the pricing impact of CACs could be sensitive to the prevailing sovereign financial and macroeconomic conditions, it is important to understand the different pricing impact during crises, particularly during the European sovereign debt crisis. To understand the differences in sovereigns' cost of borrowing during times of normalcy and crisis, we divide the sample into five periods, based on main events related to CACs and financial market and sovereign market crises. As for our analysis relating to credit ratings, we use two groups of investment grade (AAA to BBB-) versus noninvestment grade (below BBB-). This allows the examination of the impact of each rating group on bond prices.

4.3. Empirical Results

Based on our overall sample, which spans a period of over 23 years (287 months) and covers 1,025 bonds, our overall results suggest that the presence of CACs is associated with lower secondary-market sovereign bond yield spreads,[10] with the relationship being more pronounced for noninvestment-grade issuers. These results are in line with findings from Bradley and Gulati (2013), who examine the pricing impact of CACs on the primary-market yield of 746 bonds from 75 countries between 1990 and 2011.[11] They show that countries with weak credit ratings benefited from including CACs in their bonds, whereas the yield of high-rated issuers is not affected by the inclusion of CACs in bond contracts.

Our results indicate that most of the time, the presence of regular CACs is negatively associated with bond yield spreads (except for the European sovereign debt crisis period). This means that the presence of regular CACs is associated with lower borrowing costs, with this trend being more consistent for noninvestment-grade issues. However, for investment-grade issues, regular CACs have a positive coefficient, indicating that they are associated with higher borrowing costs, over the considered different times. This seems to be counterintuitive, as a restructuring is less likely to happen to the more creditworthy issuers and investors would not typically price bonds based on their legal clauses related to restructuring. However, our results do not detect moral hazard concerns in pricing for noninvestment-grade issuers.

[10] Spreads denote the difference of each bond's yields over the corresponding bond yield of the currency of issuance, i.e., the 10-year U.S. government treasury, German bund, Japanese government bond yield in basis points.

[11] Bradley and Gulati (2013) looked at the primary markets in Europe and spread at issuance, at one point of time.

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The examination of the pricing impact of enhanced CACs, after ICMA introduced strengthened CACs in August 2014, is rather novel in the literature. Our results suggest that bonds that included enhanced CACs exhibit negative signs with spreads – which means that the presence of enhanced CACs is associated with lower secondary-market yield spreads, while they are found to be consistently statistically significant. This is consistent with expressed views from issuers and investors saying they do not price bonds based on their legal clauses, and it is likely that these results will persist after the current period of market distress.

4.3.1. Determination of bond pricing

Explanatory variables are added to enhance the understanding of the relationship between secondary-market yield spreads and each independent variable, with most coefficients generating the expected sign. In particular, we employ credit ratings, remaining maturities, bond-specific characteristics, bid-ask spreads, and other macroeconomic and financial market determinants as the main explanatory variables:

Credit ratings (time-variant)

Looking at credit ratings during May 1996 to March 2020, our results suggest that credit ratings are strong explanatory variables in the determination of secondary-market yield spreads. The more creditworthy bonds (1–10 numeric values) are associated with lower yield spreads, and less creditworthy bonds (numeric values over 10) are associated with higher yield spreads (higher risks). This result is statistically strong over the different periods.

Remaining maturities (time-variant)

Residual maturities change based on each data point, and the results suggest that remaining maturities are strong explanatory variables and they are positively associated. The more the months to maturities means higher yield spreads, just in line with sovereign bond yield curve and term structures. The remaining maturities are statistically strong regardless of the creditworthiness of issuers.

Bond-specific characteristics

Coupon and tranche volumes are positively associated with yield spreads, while tranche volumes are important variables to determine the yields. Issue currency seems meaningful as well, suggesting issuing in euros or US dollars is associated with lower yield spreads compared to bonds issued in other currencies (Japanese yen, British pound, Scandinavian currencies, Chinese renminbi). Governing law is not a consistently significant determinant, changing signs over the various considered periods. Our results show that English governing law is associated with higher yield spreads only in the latest periods (after 2014), with this relationship being statistically significant. This result is somewhat in line with the study of Ratha and others (2016), although we do not find evidence that English law-governed bonds are consistently associated with higher yield spreads throughout the whole-time periods.

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Bid-ask spreads

We use bid-ask spread changes of each bond over the time period to see the relationship between sovereign bond liquidity and secondary-market yield spreads. In comparison to the use of primary-market yield data and comparing to primary-market liquidity analysis, we obtain more consistent results using secondary-market data, namely that they are positively associated, indicating that the more liquid bonds are (lower bid-ask spread), the lower yield spreads are (lower risks). They are statistically significant during the crisis time since 2007, regardless of credit ratings groups; this association is slightly more pronounced for the noninvestment-grade issuers group. Related to liquidity, our secondary-market analysis on SEC registration shows a statistically strong negative relationship between SEC registration and yield spreads since 2010, which can be interpreted that bonds with SEC registration (more liquid market and more information documents) is associated with lower yield spreads.

Other macroeconomic and financial market variables

The consumer price index annual growth rate is positively associated with yield spreads, which indicates that when the inflation rate rises, bond yield spreads rise accordingly. The CDS spread and market VIX are positively associated as expected, meaning yield spreads increase as market risks increase. Commodity prices are not statistically significant and generate mixed signs, probably reflecting risks in different directions of bonds from commodity-exporting and -importing countries. It is also interesting to note that during the European sovereign debt crisis, monetary union members were associated with higher secondary-market bond yield spreads. The results of all the macroeconomic indicators broadly confirm that macroeconomic fundamentals play a major role in explaining governments bond yields differentials.

4.3.2. Impact of CACs and enhanced CACs on bond pricing

To understand the differences in the cost of sovereign capital borrowing during normal times and at times of crises, we break down the sample into the following periods:

1. Before New York law-governed sovereign bonds included CACs: May 1996–January 2003
2. Pre-global financial crisis: February 2003–May 2007
3. Global financial crisis: June 2007–December 2009
4. European sovereign debt crisis: January 2010–August 2014
5. After ICMA introduced enhanced CACs: September 2014–March 2020

When we use the entire country sample, we notice that US dollar bonds and New York law-governed bonds are associated with excessively high bond yield spreads since 2014. Further, we observe that this result is mainly due to the abnormal pricing behavior of 14 of Venezuela's sovereign bonds. As Venezuela is suffering a prolonged macroeconomic crisis and a sovereign debt default since 2017, its bonds have experienced a jittery secondary-market pricing pattern. Since this erratic price behavior was a major source of distortion of our results, we exclude Venezuela's sovereign bond pricing data from this analysis. The results for the five periods discussed below are summarized in Tables 3–7 and in Annex II, Table A1.

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Before New York law-governed sovereign bonds included CACs (pre-February 2003)

Due to the limited data available during this period, we encounter a *near singular matrix* problem, and thus we reduce the number of variables to obtain the best fit for the model. Before 2003, most English law-governed bonds included CACs, but not all of them. According to our results (Table 3), CACs are estimated to have contributed to lowering the yield spreads by 1.3 percent (statistically significant) for the investment grade issuers, while its effect becomes insignificant for noninvestment-grade issuers.

Table 3
Regression Results: Before New York Law-Governed Bonds Adopted CACs (pre-February 2003)

Secondary markets: Panel regression results
Dependent variable: Spread over benchmark in bps

	Before CACs usage became prevalent in New York law		
	1996M5–2003M1		
	Total	**Non-investment grade**	**Investment grade**
Coupon	102.1**	57.8*	435.2**
Outstanding$	207.2**	184.5	-282.8
Maturity	10.4**	114.7**	6.4*
IG	-127.3*		
Eur	-115.7		-115.7*
UK law	-18.3		513.3
VIX	18.7**		14.0**
SEC	-53.3		-399.5**
EM	-198.8*		-868.6
Regular CACs	109.9	110.1	-135.8*
C	-217.4	375.3	-155.3
R-squared	0.42	0.34	0.66

Notes: ** 99% significant, * 95% significant.

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Pre-global financial crisis (February 2003–May 2007)

Since Mexico's landmark inclusion of CACs in 2003, most New York law-governed bonds have included CACs. The benefits of including CACs in emerging-market bonds appear to be recognized by investors based on secondary-market behavior. After New York law-governed sovereign bonds prevalently included CACs, we find that spreads of bonds with CACs are lower than those of bonds without CACs in the entire sample (Table 4). In particular, there is evidence that CACs lead to a decrease in secondary-market bond yield spreads and in turn in the cost of borrowing for both noninvestment-grade and investment-grade issuers (all results are statistically significant).

Table 4
Regression Results: Pre-Crisis (February 2003–May 2007)

Secondary markets: Panel regression results
Dependent variable: Spread over benchmark in bps

	Pre-crisis		
	2003M2–2007M5		
	Total	**Non-investment grade**	**Investment grade**
Coupon	342.0**	8.3	103.1**
Outstanding$	747.1**	45.2	2.4
Maturity	-179.7**	-18.6**	18.7**
USD	235.4**	282.6**	
NY law	-117.9	539.7**	107.3*
SEC	-532.2	-281.1**	24.9
CPI(-6)	1.1		
DEBT(-6)	1.9**	4.6**	
EXR	11.9		
VIX	8.3**		8.3**
Regular CACs	-296.4**	-263.2**	-210.8**
C	360.8	377.2	-380.7
R-squared	0.97	0.89	0.90

Notes: ** 99% significant, * 95% significant.

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Global financial crisis (June 2007–December 2009)

During the global financial crisis, when market participants became aware of sovereigns' declining financial conditions, the price of their bonds was expected to fall, while bond yield spreads were expected to rise. These changes in the price and bond yield spreads usually reflect the *ex post* sovereign bond market behavior during crises and these secondary-market bond yield spreads are typically used as a reference rate in a debt restructuring or in an extension of the debt maturity.

Based on our results, inclusion of CACs appears to decrease the bond yield spreads for noninvestment-grade countries by 402 basis points, while it is positively associated with investment-grade issuers (both statistically significant) (Table 5). Our finding that CACs have no harmful pricing impact on the less creditworthy issuers is in line with Bradly and Gulati (2013).

Table 5
Regression Results: Global Financial Crisis (June 2007–December 2009)

Secondary markets: Panel regression results
Dependent variable: Spread over benchmark in bps

	Global Financial Crisis		
	2007M6–2009M12		
	Total	**Non-investment grade**	**Investment grade**
Coupon	1.1	51.7**	39.0**
Outstanding$	6.1	19.5**	12.5**
Maturity	-14.1	-57.1**	4.6**
IG	-119.7**		
USD		925.9**	-308.7**
NY law	61.8**	-235.1*	55.3**
SEC	-63.9	-735.8*	38.9*
CDS	0.0**	0.3	0.8**
CPI(-6)	10.6*	35.2**	-3.6
DEBT(-6)	-7.5	-2.3	-0.1
EXR	0.0**	154.6*	0.0**
VIX	-0.6	-4.0*	0.4*
EMBI	0.5**	0.9**	
Regular CACs	83.2	-402.0**	137.8**
C	1526	1158	-9452
R-squared	0.87	0.91	0.76

Notes: ** 99% significant, * 95% significant.

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European sovereign debt crisis (January 2010–August 2014)

For the overall sample during this period, inclusion of CACs seems to have been associated with slightly higher borrowing costs, with a statistically significant impact (Table 6). Further, for both investment-grade issuers and noninvestment-grade issuers, inclusion of CACs is associated with higher bond yield spreads with the effect being statistically significant. It should be noted that these results are affected by the inclusion of Greece in this analysis, being in the BBB group in 2010 (S&P's credit rating deteriorated from BBB+ on December 16, 2009 to BB+ on April 27, 2010, to CC on July 27, 2011, to SD on February 27, 2012, to B– on December 18, 2012, and to B on December 12, 2014).

Table 6
Regression Results: European Sovereign Debt Crisis (January 2010–August 2014)

Secondary markets: Panel regression results
Dependent variable: Spread over benchmark in bps

	European Sovereign Debt Crisis		
	2010M1–2014M8		
	Total	**Non-investment grade**	**Investment grade**
Coupon	16.9**	48.7**	44.6**
Outstanding$	6.0**	30.0	2.7*
Maturity	1.2**	4.6	1.3**
IG	-154.9**		-83.3**
Bid-ask spread	73.0**	34.9**	8.7
USD	-131.3**	-176.0	-165.2**
NY law	26.6**	-170.0	49.9**
SEC	-55.4**	48.7	-55.4**
CDS	0.0**	-0.1**	0.1
CPI(-6)	-3.3	-2.8	-8.5
DEBT(-6)	0.0	1.7	-1.2*
VIX	2.1**	-0.7	0.6*
Exchange rate	0.0*	0.0	0.0
EMBI	0.6**	0.7**	0.7**
Regular CACs	82.2**	129.0*	62.8**
C	-2376	-8938	-2653
R-squared	0.90	0.93	0.84

Notes: ** 99% significant, * 95% significant.

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After ICMA introduced enhanced CACs (September 2014–March 2020)

In examining the pricing impact of the inclusion of the ICMA enhanced (single-limb) CACs after they were introduced in August 2014, we find that the presence of enhanced CACs seems to be negatively associated (statistically significant) with bond yield spreads, for both noninvestment-grade issuers and investment-grade issuers (Table 7).[12] During this period, regular CACs appear to have a negative and statistically significant association with bond spreads for the whole sample. Such empirical results demonstrate that inclusion of enhanced CACs and regular CACs is associated with lower borrowing costs for the sovereign.

Table 7
Regression Results: ICMA Enhanced CACs (September 2014–March 2020)

Secondary markets: Panel regression results
Dependent variable: Spread over benchmark in bps

	ICMA introduced enhanced CACs		
	2014M9-2020M3		
	Total	**Non-investment grade**	**Investment grade**
Coupon	39.4**	24.2**	29.9**
Outstanding$	1.2	8.1	-2.5
Maturity	2.8**	3.1**	2.7**
IG	-161.5**		
Bid-ask spread	36.8**	26.2**	177.9**
USD	-101.7**	-53.1*	-47.5**
NY law	23.4**	43.9	-20.9**
SEC	-22.9*	-11.6	-6.4**
EMBI	0.2**	0.1**	-0.1**
VIX	1.4**	4.3**	1.5**
CDS	0.0**	0.0**	0.1**
Exchange rate	0.0*	-0.2*	0.0**
CPI(-6)	1.9**	-1.0	0.4
DEBT(-6)	-0.1	0.4	1.1**
Enhanced CACs	-17.9**	-129.8**	-16.6*
Regular CACs	-31.9**	-85.9**	-34.5**
C	-5603	-5983	-5580
R-squared	0.73	0.45	0.64

Notes: ** 99% significant, * 95% significant.

[12] For this period, we exclude (Bloomberg) pricing data for 14 Venezuela bonds because of highly volatile secondary-market trading activity.

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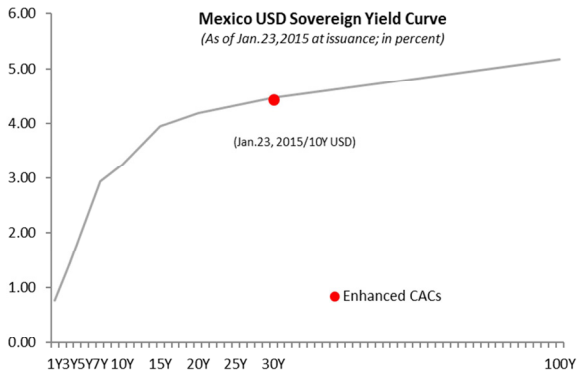
5. EFFECTS OF CACS ON PRIMARY-MARKET ISSUE YIELDS OF SELECTED COUNTRIES

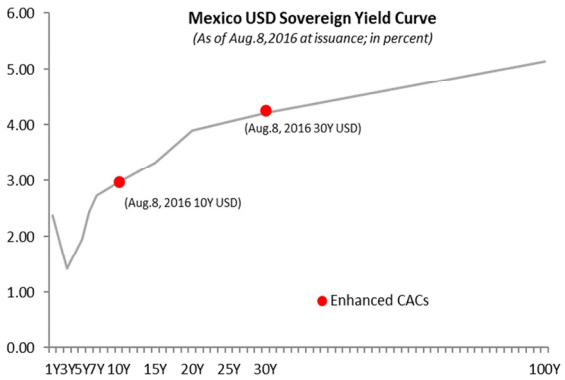
In this section, we illustrate the trends of the cost of borrowing for selected countries' bonds without CACs, with regular CACs, and with enhanced CACs. For meaningful comparisons, we select countries that possess relatively similar bond characteristics (with regard to coupon rate, remaining maturity, tranche volume, currency, and ratings). Thus, we look at Mexico (New York law) and Romania (UK law) as investment-grade issuers, while we look at Indonesia (New York law) as lower-grade or noninvestment-grade issuers. This section intends to complement previous econometric results and demonstrate that idiosyncratic differences in individual countries, for example, due to varying liquidity in sovereign bond markets, investor base compositions, or geopolitical risk, may be responsible for differences in yield spread movements.

When the yields of bonds with enhanced CACs are compared with respective bond yields at the sovereign yield curve, no obvious pricing impact is observed. Further, in the secondary market, when these major issuers (Mexico, Romania, Indonesia) are examined at market lows and highs, based on the performance of their sovereign CDSs, no pricing difference for bonds with enhanced CACs was observed, even during debt distressed periods. For example, Mexico's and Indonesia's bonds with enhanced CACs did not display materially higher yields, being consistently aligned with the respective sovereign bond yield curves. In particular, Mexico's bonds with enhanced CACs seem to have been priced based on Mexico's standing sovereign USD yield curve. Under UK-governing law, we observe a similar same pattern – the pricing of Romania's new EUR bonds with enhanced CACs is aligned with the EUR sovereign yield curve, during both normal and distressed times.

Figure 3
Enhanced CACs: Pricing at Issuance Based on Sovereign Yield Curve[13]



Source: Bloomberg LP.



Source: Bloomberg LP.

[13] Following bonds are included in the figures: Mexico: ISIN US91087BAA89, ISIN US91086QBG29, ISIN US91087BAB62; Indonesia: ISIN US455780BT24, ISIN US455780BU96, ISIN US455780BV79, ISIN USY20721BP35; Romania: ISIN XS1312891549, ISIN XS1313004928, ISIN XS1420492792.

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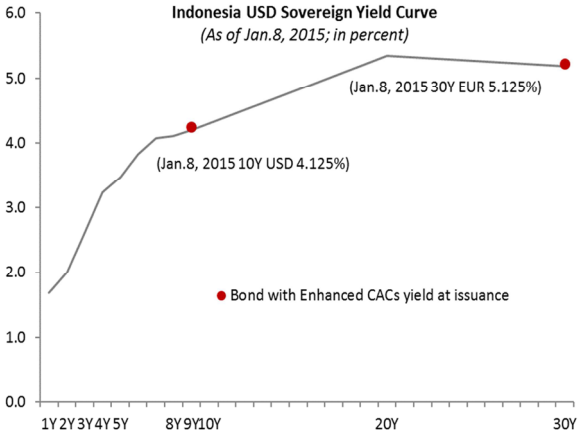
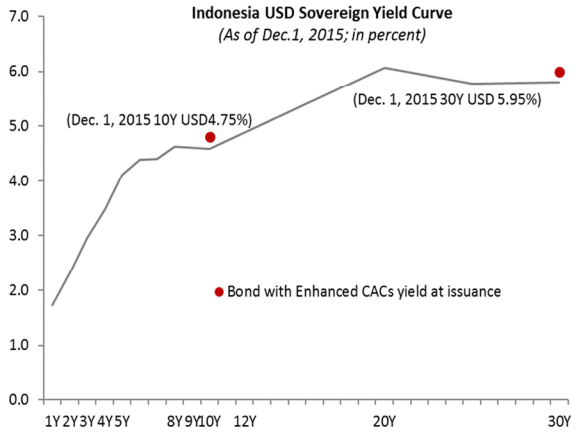
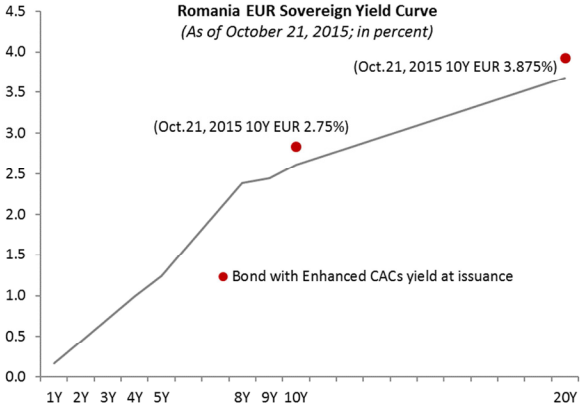
Figure 3 (continued)



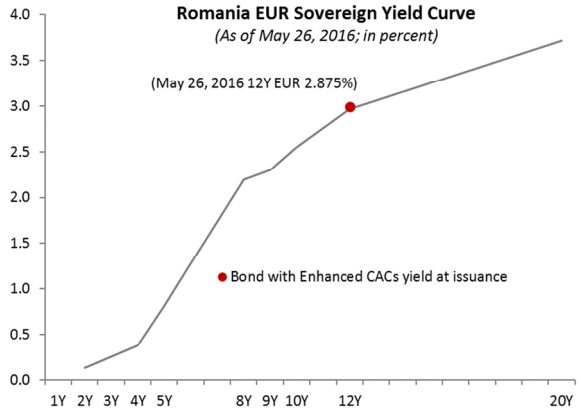
Source: Bloomberg LP.



Source: Bloomberg LP.



Source: Bloomberg LP.



Source: Bloomberg LP.

6. CONCLUSION

This empirical study provides novel quantitative estimates on the effect of the use of CACs and enhanced CACs on bond pricing. Using secondary-market sovereign bond yield spreads, our general findings indicate that the inclusion of regular CACs contributes to lower costs, as observed for both investment- and noninvestment-grade issuers during most of the considered periods: (1) pre-CACs inclusion in New York law-governed bonds (May 1996–January 2003); (2) pre-global financial crisis (February 2003–May 2007); (3) during the global financial crisis (June 2007–December 2009); (4) during the European sovereign debt crisis (January 2010–August 2014); and (5) after the ICMA introduced enhanced CACs (September 2014–March 2020). In particular, the bond yield spread/borrowing cost-reducing effects are more pronounced for noninvestment-grade issuers, who are traditionally more subject to moral hazard concerns. These findings are more consistent in the first two periods under examination, while they start to lose statistical significance since the global financial crisis.

In general, our results are consistent with those views of previous studies that argue the inclusion of CACs is associated with lower borrowing cost. This finding could be interpreted as an implied acknowledgement by secondary-market investors of CACs' potential benefits to an efficient and orderly restructuring process, which especially helps the pricing of noninvestment-grade issues. Also, our results indicate that the presence of enhanced CACs exhibits a negative association (statistically significant) with spreads. However, to better grasp how the inclusion of

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enhanced CACs affects secondary-market bond yield spreads, a deeper understanding of what affects changes in the investor base is needed. Specifically, the following factors pose limitations to such analysis and warrant further investigation:

The composition of the investor base, which may change quickly as a result of emerging market developments, could influence bond prices. This could be due to differences in the pool of creditors for bonds with and without CACs, or to changes in the creditor base (for example, because of the political leaning of the government, although this assumption may be difficult to prove in an empirical analysis). Further, during debt-distressed periods, for instance, it has been reported that institutional investors are largely replaced by hedge funds, and sometimes by official creditors. This might change market participants' behavior and in turn affects bond pricing[14,15].

The observed variations of CACs, which are formulated to suit each issuer's needs and preference, may have differential bond pricing effects. This study does not make a distinction, for example, of the minimum voting requirement to modify the contractual terms, which varies (66.6 percent, 75 percent, 85 percent, and 100 percent)[16]; the mandatory meeting requirement; aggregation; acceleration; reverse acceleration; and collective representation (Bradley and Gulati 2013). Also, for the purpose of our study, Euro CACs with a double-limb arrangement are classified as regular CACs, while CACs with a single limb are classified as enhanced CACs.

Other contractual provisions, such as the pari passu/modified pari passu, may influence the secondary-market liquidity of bonds and their pricing. After Judge Griesa's interpretation of the Argentine pari passu clause under New York law, market participants became concerned about different interpretations of the pari passu clause under New York law and non-New York law. Also, there might be a pricing impact from the presence or absence of cross-default clauses, engagement clauses, disenfranchised clauses, and information covenant clauses. Further, the mode of meetings, frequency of meetings, and how eligibility of investors is formulated could influence bond prices are not addressed in this study.

Variations in credit ratings and their effect on bond pricing are not considered to avoid a complicated analysis. This study focuses on two groups of credit ratings, an investment-grade and a noninvestment-grade group. Although there are significant variations in ratings within the same investment-grade group, this study does not distinguish among more specific credit ratings to provide more precise information for individual countries' characteristics. In particular, for lower to medium-grade issuers (for example, BBB+/BBB/BBB-), further investigation is warranted on how markets price bonds.

Issuer structure, such as trustee or fiscal agency, and its impact on bond pricing are not addressed in this study. A common assumption is that bonds under trustee structure are in favor of creditors, while a fiscal agency structure favors sovereign issuers. However, only an empirical analysis can indicate whether the issuer structure is important enough to influence investor behavior in the primary and secondary markets, especially during crises.

Also, investors treat restructured/exchanged bonds differently, since some feature specific payment schedules. Amortized bonds (with sinking schedule) or bonds with a near-maturity equal installment payment feature may have different bond pricing effects, which warrants further study.

[14] The IMF has quarterly series of investor base information for 24 advanced economies and 24 emerging- market countries, where relatively low level of trading in several emerging market countries precludes the collection of this type of data at a higher frequency.

[15] Although central bank purchases of government bonds, such as the QE operations, can be part of the overall demand for government bonds, we have not included such purchases in our analysis, as they mainly relate to monetary policy initiatives and not to market (investor base) activities.

[16] Absence of CACs is interpreted as 100 percent minimum voting requirement.

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Overall, using an extensive secondary-market bond spread dataset, we find that CACs lowered the cost of borrowing for most of the considered historical periods. Indicatively, we find that the inclusion of enhanced CACs is associated with lower bond yield spreads. Since regular CACs and single-limb CACs are expected to ensure an orderly and efficient debt restructuring process, the inclusion of these legal clauses is assumed to benefit both issuers and investors alike.

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ANNEX I
Description of Variables

This annex provides a description of variables included in the primary- and secondary-market analyses[17]:

- Mid-yield to maturity: Monthly data are based on the simple average of daily mid-yield to maturity from May 1996 to March 2020 (time-variant).
- Sovereign bond yield spread over relevant benchmark: This variable is calculated based on the issue currency. If the issue currency is the U.S. dollar, we use US treasury 10-year generic yields to calculate the spread. For euro-denominated bonds, German 10-year bond generic yield are used as benchmark, while for Yen-denominated bonds, we use Japanese 10-year bond generic yields.
- Credit rating: S&P foreign-currency long-term sovereign credit ratings are converted to numeric values, as outlined in Annex II, Table A2. This metric is also complemented by Moody's and Fitch ratings when the S&P rating is not available. A sovereign credit rating for each data point is converted to a numeric value over the months (time-variant).
- Credit rating at issuance: S&P foreign-currency long-term sovereign credit ratings at issuance are converted to numeric value, as outlined in Annex II, Table A2.
- Maturity: year of maturity.
- Remaining maturities: Years to maturity is calculated based on the last day of the month (time-variant).
- Bid-ask spread: The bid-ask spread is calculated based on bid and ask prices for each month. This monthly series is based on the average of daily series whenever there was a meaningful bid price and ask price (time-variant).
- Coupon: Each bond's coupon in percent (time-invariant).
- Outstanding $ amount: Each bond's outstanding tranche volume, not the total deal volume. Each tranche volume is converted to billions of US dollars based on the exchange rate of the date of issuance (time- invariant).
- EUR currency: If a bond is issued in euros, the value is 1, otherwise 0 (binary value).
- USD currency: If a bond is issued in US dollars, the value is 1, otherwise 0.
- English law: If the governing law is English law, the value is 1, otherwise 0, with the significant majority of other cases being New York law. Also, we employ another governing-law category, while *English law, New York law,* and *other governing law* are mutually exclusive and their value adds up to 1 for each bond. Other governing law comprises less than 2 percent of total cases (time-invariant).
- CDS spread: Monthly series of each sovereign issuer's CDS spread is used for each specific bond. Monthly series are simple averages of daily series (time-invariant).

[17] Selection of variables are consistent with other literature on determinants of emerging market sovereign bond spreads, e.g. Bellas, Dimitri, Michael G. Papaioannou, and Iva K. Petrova (2010), Determinants of emerging market sovereign bond spreads: Fundamentals vs. financial stress (IMF Working Paper 2010/281).

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- VIX: CBOE Volatility Index at the time of the issue date, a measure of the implied volatility of S&P 500 index options, calculated and published by the CBOE (time-variant).
- SEC: If a bond is registered in SEC at the time of issuance, the value is 1, otherwise 0.
- Consumer Price Index (CPI): Annualized consumer inflation growth rate in percent, monthly
- Exchange rate (EXR): National currency to US dollar, monthly average of daily exchange rates.
- Debt-to-GDP ratio of previous year: Debt to GDP in percent in the year *t*-1
- Commodity price index.
- Monetary union: If the issuer is a member of a monetary union at each data point, the value is 1, otherwise 0.
- No CACs: Based on the sales documents and prospectuses available from Perfect Information, Dealogic, and Bloomberg database, if a bond does not include collective action clauses, the value is 1, otherwise 0. Up to August 2014, *no CACs* and *CACs* are mutually exclusive, and they add up to 1 for each bond. For the period of September 2014 to November 2016, *no CACs, CACs,* and *enhanced CACs* are mutually exclusive, and they add up to 1 for each bond.
- Regular CACs: Based on the sales documents and prospectuses available from Perfect Information, Dealogic, and Bloomberg database, if a bond includes collective action clauses, the value is 1, otherwise 0 (time-invariant).
- Enhanced CACs: Based on the sales documents and prospectuses available from Perfect Information, Dealogic, and Bloomberg database, if a bond includes ICMA's enhanced version of collective action clauses, the value is 1, otherwise 0. IMF Legal Department staff verify the correct indexing of this information (time-invariant).
- Emerging markets (EM): If the issuing country is an Emerging Market and not an advanced economy, according to the IMF WEO definition, the value is 1, otherwise 0 (binary value).

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ANNEX II
Alternative Regression Results to Table 7

To better control the impact of the inclusion of CACs on sovereign bond pricing, we limit the sample to U.S. dollar-denominated sovereign bond issuances. Also, to eliminate a potentially endogenous-variable bias, we revise the model by eliminating three of the previously employed independent variables, namely that of the time-variant sovereign credit ratings, the sovereign five-year credit default swap, and the bid-ask spread. In order to have more meaningful results, this model also excludes spreads over 1,000 basis points, where price discovery is very weak due to limited liquidity and trading activity because of a debt default or an imminent debt restructuring. Table A1 reports on the results of the revised model.

Table A1
Alternative Regression Results: ICMA Enhanced CACs (September 2014–March 2020)

Secondary markets: Panel regression results
Dependent variable: Spread over benchmark in bps

	ICMA introduced enhanced CACs		
	2014M9–2020M3		
	Total	**Non-investment grade**	**Investment grade**
Coupon	27.7**	-5.9	11.8**
Outstanding$	-52.4	-111.2	19.9**
Maturity	3.4**	4.5**	2.6**
NY law	-41.4**	-160.0**	-18.7**
SEC	-15.4**	42.7**	-42.0**
EMBI	0.5**	0.4**	0.3**
VIX	1.1**	2.3**	1.4**
Exchange rate	0.0**	0.0	0.0**
CPI(-6)	0.1	-1.5	-3.3
DEBT(-6)	0.3*	1.6*	-1.6*
Enhanced CACs	-29.6*	-70.5*	-35.4**
Regular CACs	-59.9**	-113.7**	-28.9**
C	-676.0	-869.2	-515.9
R-squared	0.66	0.48	0.69

Notes: ** 99% significant, * 95% significant.

Our findings from this revised model, which focuses on U.S. dollar-denominated bonds, demonstrate that inclusion of single-limb CACs is associated with lower borrowing costs for both noninvestment- and investment-grade issuers, while inclusion of regular CACs is associated with even lower borrowing costs. Noninvestment-grade issuers are benefitted more from including single-limb CACs than investment grade issuers, which agrees with the argument that investors may view inclusion of single-limb CACs more beneficial for noninvestment-grade issuers who have a greater chance to face a debt restructuring. When we include bonds with spreads over

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1,000 basis points, we get similar results but R-squared is falling drastically to 22 percent. Elimination of the potentially endogenous variables from the model does not necessarily lead to but supports the causal effects between the dependent and independent variables. These results indicate in a consistent manner that market participants do not associate the inclusion of enhanced CACs with potential future restructurings.

Table A2
Conversion of Credit Ratings to Numeric Values[18]

Composite credit ratings	Numeric value		
AAA	1	Prime	Investment grade
AA+	2	High Grade	
AA	3		
AA-	4		
A+	5	Upper Medium Grade	
A	6		
A-	7		
BBB+	8	Lower Medium Grade	
BBB	9		
BBB-	10		
BB+	11	Noninvestment Grade Speculative	Noninvestment grade
BB	12		
BB-	13		
B+	14	Highly Speculative	
B	15		
B-	16		
CCC+	17	Substantial Risks	
CCC	18		
CCC-	19		
CC+	20	Near Default	
CC	21		
CC-	22	In Default	
C+	23		
C	24		
C-	25		
D	26		
Not rated	27		

[18] Following studies also used the similar rating conversion methods: Ferri, Giovanni, Li-Gang-Liu, and Giovanni Majnoni (2000) "How the proposed Basel guidelines on rating-agency assessments would affect developing countries", Mimeograph, World Bank and University of Bari; Canuto, Otaviano, Sanket Mohapatra, and Dilip Ratha (2011) "Shadow Sovereign Ratings", The World Bank, *The Economic Premise*, Poverty Reduction and Economic Management Network (PREM), August, No. 63. Available via: www.worldbank.org.

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