Expanding the Central Bank's Tool Kit: Monetary Policy in light of the COVID-19 Crisis

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The COVID-19 pandemic was a negative shock to the real economy and induced both liquidity pressures and operating losses for firms across the world and weakened their insolvency. Monetary authorities were left to contend with harmonising the accuracy of their policy measures with the speed of reaching those most affected. Utilising a combined empirical approach of Propensity Score Matching (PSM) and scenario analysis, this study evaluates the impact of credit guarantee schemes as a counter-cyclical tool during a crisis in the small open economy of Barbados. The results suggest that credit guarantee schemes represent a viable monetary policy tool during a crisis to shift persistent liquidity from the banking sectors to the illiquid corporate sector.

Keywords: monetary policy; propensity score matching; average treatment effects, small open economy

1 Introduction

In March 2020, the global economy was brought to a screeching halt. The economic and financial crisis that would ensue was unprecedented. Unlike the Twin Crises of 2008/2009, the COVID-19 pandemic could not be contained or restricted to one sector but instead inflicted damage to global production and supply chains, dismantled international trade, foreign direct investment (FDI) flows, international financial markets and international tourism and travel(Sarker, 2020). As businesses were forced to close their doors and individuals confined to their homes, fiscal and monetary authorities were left to determine how to strike the difficult balance between responding promptly to the pandemic and maintaining a sufficient level of prudence(Baudino, 2020).

The pandemic, unlike previous crises was a negative shock to the real economy and induced both liquidity pressures and operating losses for firms across the world and weakened their insolvency. In many countries across the world, small to medium sized enterprises (SMEs) are considered the backbone of the economy and, they represent the overwhelming share of companies. In terms of numbers, SME's typically account for well over half of the employed workforce and slightly less in terms of turnover and investment(Schich et al., 2017). Furthermore, SME's are often considered a key engine of technological innovation, productivity, growth and employment creation(OECD, 2010). Numerous governments responded by providing or extending credit guarantees to help limit potential losses. Central bank responses across the world are documented in a number of studies(Brault & Signore, 2020; Cusmano, 2013; Dikau et al., 2020; Kim et al., 2021). The main policy tools deployed in support of SMEs were credit guarantee

schemes (CGSs)(Brault & Signore, 2020). By April 2020 the US had pledged approximately 560 billion USD of guaranteed loans and the EU 1600 billion euros, with the European Investment Fund (EIF) pledging another 25 billion euros. Kim et al (2020), in particular, point out that during the COVID-19 crisis, countries like Hong Kong; China; Malaysia; Philippines; Republic of Korea; Brazil; and Germany increased the coverage ratio for their schemes; while others like Australia, Republic of Korea and South Africa increased the loan tenure. Additionally, several central banks extended their collateral pools, and included credit claims issued under the guarantee programmes as responses to COVID-19(Baudino, 2020).

In contrast, despite having tenured CGSs at their disposal, the monetary authorities in Barbados did not exploit these schemes as a counter-cyclical tool to stem the sudden onset of illiquidity in the system. Instead, the securities ratio for banks was lowered and for non-bank deposit taking licensees the securities ratio was eliminated. As a small open economy, the banking system operates under paradoxical circumstances as it is usually inundated with persistent liquidity but illiquidity within the corporate sector. During the pandemic, banks were more focussed on ensuring lower moratoriums on existing loans than increasing their risks with new loans. Even if banks were not rationing credit provision, most firms would not have been able to qualify due to the marked decrease in sales. Nevertheless, just over a decade prior, CGSs were used as an investment-favouring tool in other countries, especially during the great recession. Guaranteed companies' assets grew 5.36% more than those of their non-guaranteed counter-parts during the crisis than during economic recovery when the former saw 2% higher growth in assets than the latter(Martin-Garcia & Moran Santor, 2021). Access to finance for enterprises deteriorated during and in the aftermath of the 2008-09 global financial crisis as banks engage in credit rationing to minimise risks. In some countries,

existing loan guarantee programmes were ramped up during the crisis, in terms of the total amount of guarantee funds and direct lending available, the percentage of the loan guaranteed, the size of the guaranteed or direct loan and the number of eligible enterprises(Cusmano, 2013). Consequently, in a crisis, a CGS should be able to shift the liquidity from the banking system to the corporate sectors suffering from credit rationing to potentially dampen the negative impact on the real economy and prevent widespread disruptions.

This research explores the evolving role of central banks in crisis environments and how credit guarantees could be used to expand the toolkit of the Central Bank of Barbados. Likewise, it empirically evaluates how CGSs impact firms during a crisis by simulating what firms could've experienced had it been used as a policy tool in the response to COVID-19 pandemic. Lastly, it contributes to the limited literature by highlighting opportunities for existing capacities to be leveraged in crisis and non-crisis environments.

The rest of the paper is organised as follows. Section 2 provides a summary of the literature on how central banks respond in a crisis environment as well as how credit guarantee schemes have been used in the past. Section 3 outlines the methodology used in the study, while section 4 summarises the key findings and a discussion of how SMEs could have benefited from CGSs during the COVID-19 pandemic. Section 5 provides a summary of the findings of the paper and some recommendations of how CGSs can be used by central banks in the wake of a shock.

2 Literature Review

2.1 The Role of Central Banks in a Crisis Environment

Historically, the role of central banks has not changed but rather has evolved in response to crises and an ever-changing financial and economic environment. Goodhart (2011), for example, identified three epochs in relation to central banking: the Victorian Era of the 1840s to 1914; government control, 1930s to 1960s; and, market era, 1980s to 2007. The end of each era was associated with a period where economists searched for a new framework of how central banks would achieve their objectives. Goodhart argues that the central bank's control of its balance sheet is its fundamental function, even more so than setting short-term interest rates. The Great Financial Crisis (GFC) of 2008/2009 period arose from the asset side of banks' balance sheets whereas past crises all occurred on the liability side. Subbarao (2010) contends that preventing an asset price build up should be within the remit of a central bank. Central banks have a role in preventing "bank centred" bubbles, but the instrument for this is not monetary policy but regulatory intervention. The Bank for International Settlements (BIS) has, however, argued that the financial system is inherently procyclical and thus chronically prone to bubble-like behaviour (Nier,2009).

Butler (2008) takes a broader definition of financial stability, by suggesting that banks should be focused on ensuring the absence of asset price bubbles, preventing market illiquidity as well as preventing the insolvency of systemically important financial institutions. These objectives are more extensive than the market era would have conceptualised and would therefore require the central bank to utilise its balance sheet to meet these objectives. During the global financial crisis (2007-2008), for example, the Bank of England created a Special Liquidity Scheme that lent treasury for one year to commercial banks, using collateralised bonds and credit card receivables as

collateral. This approach injected significant liquidity into the financial system at a time when it was most needed.

The GFC has also shown that the central bank's lender of last resort (LOLR) instrument loses much of its potency in a 'bank run' from the asset side(Subbarao, 2010). During the crisis, central banks pumped enormous amounts of liquidity to stimulate the system through the LOLR function. While this made individual institutions liquid, the market still remained illiquid, thereby exposing the limitation of the LOLR instrument in combating illiquidity. Therefore, in addition to being the Lender of Last Resort, a central bank also has to be the Market Maker of Last Resort (MMLR) (Brault & Signore, 2020; Ojo, 2010; Subbarao, 2010; Nier, 2009). Resultingly, a central bank's de-facto role as LOLR and as an agent in the resolution of systemically important financial institutions gives them an interest in the regulation and supervision of these institutions.

In contrast, Corbo (2010) charges that the role of a central bank not only lies in treating crises but preventing them. He says the ad hoc manner with which central banks dealt with systematically important institutions during the GFC exacerbated uncertainty and inflicted damage to the system. In the same way, Canova (2015) asserts that central banks had a flawed "trickled-down" response to the crisis indicative of an inherent bias to austerity. The author notes that the Federal Reserve and other leading central banks provided massive subsidies to financial institutions and markets during the crisis while relegating other sectors of the economy and society to the pains of austerity.

2.2 Monetary Policy and COVID-19

The COVID-19 crisis once again brought the role of central banks to the forefront as they worked to provide a much-needed line of defence against the increasing deterioration of the global economic and financial systems. While the GFC engendered fear and uncertainty based on an opaque financial relationship, the impact of COVID-19 was a true negative supply and demand shock on the real sector; economic activity and employment (Haas et al., 2020). Where central banks failed in their response to the GFC, however, they responded with unusual speed and vigour. Central banks all across the world swiftly lowered interest rates, expanded collateral frameworks, implemented new or scaled-up existing quantitative easing programmes and introduced various targeted and non-targeted additional financing and purchasing facilities(Dikau et al., 2020). For example, the Federal Reserve and the Bank of England (BOE) cut short-term interest rates, while the European Central Bank(ECB) and Bank of Japan (BOJ) maintained rates that were already at or below zero(Echarte Fernández et al., 2021; Haas et al., 2020; Sarker, 2020). Mayer and Schnabl (2021) criticised this policy response and likened the cutting of interest rates to euthanasia. Fuelled by Austrian Business Cycle Theory, they purport that continued reductions in interest rates will actually contribute to an economic crisis in the long run. The boom is fuelled by credit creation in the banking sector, which raises investment above savings and thus leads to overinvestment. The boom turns inevitably into a bust when interest rates are raised to contain rising inflation. When interest rates are strongly cut in response to the downswing, distorted economic structures are conserved.

All four central banks also introduced or expanded broad asset purchases, special bank-lending facilities, and narrow asset purchase facilities. For instance, the United States dollar (USD) and the euro play important roles in international financial

markets so the Federal Reserve and the ECB expanded swap lines and created repo facilities for international monetary authorities (Domanski et al., 2014). Bahaj and Rei (2020), note that the Federal Reserve even lowered the rate on the swap lines it had with five other central banks and opened new ones in nine other currencies. The prompt and proportionate operations in their own money markets, together with the rapid establishment of a network of currency swap lines buttressed domestic and international liquidity during the initial stages of the crisis(Bingham et al., 2021). Domanski et al (2014) go further by positing that the latter consideration is proof of another evolution of central banks' role. Now the need to provide liquidity in foreign currencies is a part of their policy response toolkit.

2.3 Credit Guarantee Schemes (CGS)

Credit guarantee schemes (CGSs) are mechanisms in which a third party, the guarantor, pledges to repay some or the entire loan amount to the lender in case of borrower default. The guarantor assumes part or all of the credit risk, reducing the risk faced by financial intermediaries and thus making it possible for firms to obtain credit or improve the terms and conditions under which they can borrow(Gozzi & Schmukler, 2016). These arrangements first emerged in Europe in the 19th and early 20th centuries. Currently there are over 2250 schemes implemented in different forms in almost 100 countries (OECD, 2010). These arrangements are especially popular policy tools in Asia: Japan, The Republic of Korea and Malaysia(L. N. Dang & Chuc, 2019; Kim et al., 2021). SMEs account for most businesses worldwide and are important contributors to job creation and global economic development. According to the World Bank, they represent about 90% of businesses and more than 50% of employment worldwide(World Bank). Cusmano (2013) states that if governments are especially sensitive to the challenges faced by SMEs, then CGSs are usually established to target

challenges specific to SME's within key sectors. Therefore, these programs are usually justified based on social objectives which Zhu (2020) points out in his research on CGSs in China. The author posits that these schemes are founded in the hopes of increasing employment, tax revenue and foreign exchange earnings through foreign exports. However, Gozzi and Schmukler (2016) argue that the rationale underlying the choice of credit guarantees instead of other forms of government intervention is usually left unexplained which reduces its credibility as an effective policy tool.

Nonetheless, numerous authors mention the advantages that CGSs provide to SMEs(Brault & Signore, 2020; L. N. Dang & Chuc, 2019; T. B. Dang, 2015; Kim et al., 2021; Levitsky, 1997). The three major advantages delineated are the leverage these programs provide, regulatory capital relief and the ability to be used as a counter-cyclical crisis tool. The main advantage stems from the ability of the schemes to allow investors (usually governments) to guarantee loans multiple times larger than the CGS fund itself. In this way, the higher the leverage ratio, the more loans CGSs mobilise(Kim et al., 2021; Levitsky, 1997).

Moreover, by the time of writing this article, there was no consensus in the literature regarding the effectiveness of these schemes in contributing to economic growth, unemployment, or investment. The reasons put forward in the literature include but are not limited to the lack of rigorous evaluations by authorities which include a counter factual. A counter-factual case is needed in empirical analysis to show what would have occurred in the absence of the program. Also, there is limited appropriate (dis)aggregated data available for estimation(Schich et al., 2017). As a result, the studies that attempt to estimate the effectiveness of CGSs have done so using a variety of methodologies and samples thus producing varying results.

Essentially, the literature has shown that CGSs in a crisis environment are risk transfer and risk diversification tools used to pump liquidity into strained economies(Corredera-Catalán et al., 2021). During COVID-19 where authorities had to be more aggressive to maintain financial stability and support the flow of credit to firms and households amidst unprecedented social protocols, CGSs became and essential policy tool. However, there is a gap in the literature on empirical studies of guarantees schemes in developing countries and even less on schemes in small open economies. This research seeks to fill that gap.

3 Credit Guarantee Schemes Around the World

3.1 Barbados

The Central Bank of Barbados first introduced credit guarantee schemes in September, 1979 in an effort to promote the growth of the small business sector (Levitsky & Prasad, 1989). The scheme's objective was to enable small businesses to obtain finance from commercial banks and other credit institutions without having to provide security from their own sources. To be eligible for the guarantee, the borrower had to meet the criteria of a small business in any of the following sectors: agriculture, manufacturing, retail trade, construction, hotel industry, medical, health, educational or professional services. The commercial banks were responsible for evaluating project proposals and submitting the necessary applications to the central bank. The central bank reviewed the applications to ensure that they complied with the terms and conditions of the scheme. Generally, a bank's assessment was accepted by the central bank without further detailed investigation. Lastly, commercial banks were required to notify the Central Bank on a monthly basis of any applications that were rejected.

The first scheme was known as the Credit Guarantee Scheme for Businesses (CGSB) and faced a number of challenges since its inception primarily due to its design. Levitsky and Prasad (1989) report that despite the central bank's best efforts to simplify the process and procedures, the local commercial banks were not receptive to the scheme. The commercial banks were of the opinion that the scheme was a method to force them to approve very risky small business loans with low profitability. Despite this, the scheme exists today but it is not as active.

Against the backdrop of challenges faced with the initial program, the Government of Barbados assisted by the Central Bank of Barbados created a number of schemes under the CGSB umbrella. For example, the Tourism Loan Guarantee Scheme

provided guarantees to cover debt service and new short-term loans to hotels and other providers of accommodation to tourists in Barbados. Any business providing accommodation qualified once they had a total loans-to-property value ratio below 75%(Antilles Economics, 2014). However, much like its predecessor, this scheme is no longer active. Instead, the central bank has focussed its efforts on the recently created Enhanced Credit Guarantee Fund (ECGF).

The ECGF is partial credit guarantee fund, established to assist small and medium-sized enterprises in obtaining medium to long-term financing by providing security to eligible financial institutions for new loans (Central Bank of Barbados). By providing additional security for businesses, it reduces the risk to financial institutions. The ECGF was financed by a USD 30 million loan from the IADB. Unlike the CGSB, all businesses must be incorporated and registered to operate in Barbados making this scheme more exclusive. All applications are submitted and processed electronically, significantly reducing past processing times and guarantees can now be provided in both USD and BBD. Fewer sectors qualify for assistance with this fund: agriculture, commerce, industry, and the service sectors. For financial institutions the new fund is more attractive as it ensures they recover at least 80% of the loan in the case of default. They also have more autonomy in the administration of loans and setting of interest rates. Due to the new features of the ECGF, the fund saw greater participation from commercial banks.

Unlike other countries around the world, the Central Bank of Barbados did not utilise any of their guarantee schemes as counter-cyclical tools during the COVID-19 induced economic crisis. Instead, the central bank deployed micro prudential policies by lowering the securities ratio for banks from 17.5% to 5% and eliminated the 1.5 %

securities ratio for non-bank deposit taking licensees. The Central Bank of Barbados cautioned that due to the current debt restructuring program, they could not be seen as engaging in any activities that would increase government exposure to risk. Therefore, the fund could not be extended, or any relaxations of the criteria initiated. Within the confines of the debt restructuring program, the Central Bank targeted the securities ratio in their Lender of Last Resort function by allowing firms to access the liquidity from the securities if they wished to do so.

3.2 Chile

In 1980, the Chilean national government in tandem with a large state-owned national bank, BancoEstado established FOGAPE. FOGAPE is funded by the national government and administered by BancoEstado. It provides credit guarantees to financial institutions for loans to microenterprises and small firms. Due to under-utilisation the scheme underwent a review and was relaunched in 1999. One of the significant outcomes of the relaunch was a streamlining of the claim procedures. Within 15 days of a claim being made, guarantees are paid out in full. As at 2015, following much success the fund raised it total capital to 260 million USD(de la Torre et al., 2017). FOGAPE does not target any particular sector but limits no more than 50% of guarantees going to one sector.

The most unique feature of FOGAPE relates to how it allocates guarantee funds to financial institutions. Auctions are held four to six times a year where the scheme offers a fixed volume of guarantees. Each financial institution submits secret bids requesting guarantees for a certain volume of loans with a given coverage ratio. FOGAPE allocates guarantees to those institutions requesting the lowest coverage ratio until the total amount of guarantees auctioned equals total bids. The bidding process determines how risks are shared among financial intermediaries and FOGAPE. The

scheme is also managed to maintain low operating costs by allowing financial institutions to make all lending decisions.

FOGAPE has several design features aimed at mitigating incentive problems. First, the auctioning of guarantees fosters competition among financial institutions on the basis of the coverage ratio, providing additional incentives to screen and monitor borrowers and foster risk discovery. Second, the fee that financial institutions pay for the credit guarantees depends on past default rates of guaranteed loans. This fee, however, is capped at 2 % of the guaranteed amount per year. Finally, if claims from a given financial institution are too high, FOGAPE excludes the institution from participating in future bidding processes until loan performance improves. De la Torre et al (2017) posit FOGAPE's design creates an incentive structure for lenders that limits risk shifting and keeps operating costs low, thereby avoiding adverse selection and moral hazard among borrowers and lenders.

To respond to the sudden economic crisis caused by COVID-19, FOGAPE broadened its scope significantly with guarantees of USD 3 billion to mobilise USD 24 billion in new credits. They also allowed banks to use guarantees to refinance other credit operations with a grace period of 6 months to prevent system-wide defaults and closures (García, 2021).

3.3 Organisation of Eastern Caribbean States (OECS)

The governments of the OECS along with the World Bank established the Eastern Caribbean Partial Credit Guarantee Corporation (ECPCGC) to increase credit facilitation to micro, small and medium sized enterprises (MSME's) in 2017. The ECPCGC provides partial guarantees on loans made by financial institutions to MSME borrowers in OECS member states. Unlike the schemes available in Barbados, the ECPCGC considers credit unions among the eligible financial institutions list. By

including all financial institutions, they hope to serve a larger number of MSMEs to create jobs and expand local economies. The fund is run with a minimum number of staff to ensure that the guaranteed fee structure can cover operating expenses and pay loan losses. The fund is also completely electronic with all applications received and processed through a web portal designed for guaranteed lending. They also use electronic means of personal communication, including video and offer tutorials on topics of interest to small business owners and the loans offices who work with them. The maximum guarantee offered is 75% on loans that may not exceed 300,000 XCD.

During the COVID-19 crisis, the fund responded by offering additional products to help small businesses. In addition to the funds Classic Guarantee Program, they added the Working Capital Guarantee and the Start-up Guarantee. Of the two new programs, the Start-up program is one of interest. The facility was specifically designed to target start-up small businesses. Small businesses in operation for 3-24 months will have access to a loan of up to 100,000XCD where the ECPCGC will guarantee up to 80%. To qualify, the small businesses owners, have to register their business, maintain proper records, and establish a relationship with a financial institution of their choosing.

3.4 USA

A secure and responsible energy future relies on innovation. “De-risking” new energy technologies is a critical step in bringing innovation to market(Springer, 2018). Financing these new and innovative energy projects is often difficult. Habitually investors are hesitant to accept risk for projects that rely on unproven technologies. Green CGSs are important for mitigating the risks of green financing to unlock the participation of financial institutions in these projects(Taghizadeh-Hesary & Yoshino,

2020). Even though central banks see the need to respond to crises, not many of these institutions have explicitly considered sustainability in relation to their response. The impending climate crisis will have a potentially disastrous impact on our economies and requires urgent policy action. It is already changing the policy environment in which central banks are operating(Dikau & Volz, 2021). Given the need to meet national emission goals and targets central banks in some countries have scaled-up their activities to have a broader sustainability mandate (Dikau, Robins, & Volz, 2020). These tools included updating collateral frameworks to address climate change-related and other environmental risks, removing the carbon bias in the financial sector, adjusting prudential measures to minimise climate risks as well as adopting sustainable investment principles.

With this in mind, the US Department of Energy (DOE) has made it easier for American companies to access financing for innovative clean energy projects. Authorised by the Energy Policy Act of 2005, the Title XVII Innovative Energy Projects Loan Guarantee Program enables the DOE to issue loan guarantees for innovative and novel commercial-scale deployments of advanced fossil, advanced nuclear, renewable energy, energy efficiency and distributed energy projects in the United States(US Department of Energy). Technologies which fall within the current solicitations include carbon capture, direct air capture, small modular nuclear reactors, uprates and upgrades for existing nuclear plants, energy storage, efficient end-use technologies, and retrofits of existing renewable facilities. Eligible projects for the Title XVII program must: utilise a new or significantly improved technology, avoid, reduce, or sequester greenhouse gases, be located in the United States; and, have a reasonable prospect of repayment. Under Title XVII authority, DOE can guarantee loans for up to 80 percent of total project costs for eligible proposals. Total funding for the program

stood at USD 30 billion to be divided amongst the 5 subprograms managed by the DOE. The five sub-programs include:

- Advanced Fossil Energy Projects Loan Guarantees
- Advanced Nuclear Energy Projects Loan Guarantees
- Renewable Energy and Efficient Energy Projects Loan Guarantees
- Distributed Energy Projects
- Electric Vehicles and Alternative Fuel Vehicles

The program also makes provisions for energy projects in Tribal communities. The program is known as the Tribal Energy Loan Guarantee Program.

A decade after its inception, the program financed 24 projects, many of which were first-of-a-kind projects in the United States, among the largest in the world, or catalytic for domestic industries (Springer,2018). For example, the first five photovoltaic (PV) solar power projects larger than 100 MW in the United States benefited from the program. Table 1 below presents a summary of the different CGSs presented in this section.

Table 1: Comparison of Credit Guarantee Schemes and the Response to COVID-19

Country	Barbados	Chile	OECS	USA
Program Name	Enhanced Credit Guarantee Fund	FOGAPE*	Eastern Caribbean Partial Credit Guarantee Corporation (ECPCGC)	Title XVII Innovative Energy Projects Loan Guarantee Program
Eligibility Criteria	•Must be incorporated and registered to operate in Barbados. • Annual sales should not exceed BBD$20 million. • Total assets should not exceed BBD$20 million. • Number of employees should not exceed 200 persons.	•Total annual sales should be less than $750,000 in previous year. •Should have no existing arrears in the financial system. •Should not have expected losses at the time of loan issuance greater than 3%	•Annual or projected revenue if less than XCD 2 million. •Employ or intend to employ less than 50 permanent employees. •Must have a minimum of 25% equity in the transaction. •Maximum loan should not exceed XCD 300,000.	•Must utilise a new or significantly improved technology. •Avoid, reduce or sequester GHgs •Be located in the USA •Have a reasonable prospect of repayment.
Eligible Sectors	SME's involved in one of the following industries: •Agriculture •Industry •Commerce •Services	All sectors	All MSME owners except those on the Exclusion List	
Total Funding	USD 70 million	USD 260 million (As at 2017)	USD 8 million	USD 30 billion
Coverage Ratio	Up to 80%	Not Fixed	Up to 75%	Up to 80%
Interesting Feature	•Completely electronic •Land and building purchases can be guaranteed.	•Guarantees allocated through an auction.	•Credit unions are allowed to access the guarantees.	•Provide guarantees for novel renewable energy projects. •Has 5 sub-programs dealing with specific forms of energy.
Crisis Response		Allowed guarantees to refinance loans.	Created a Start-up Guarantee sub-program.	

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This section shows how guarantee schemes can be designed to meet policy goals in countries and act as timely and effective tools in a crisis to maintain economic growth and stability.

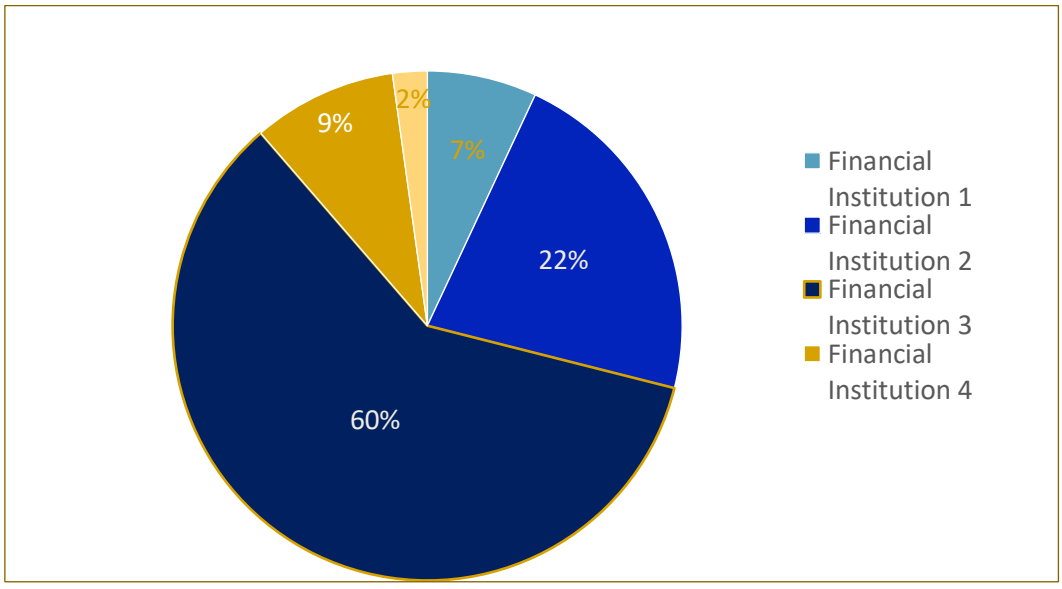
4 Empirical Methodology

4.1 Data

4.1.1 Enhanced Credit Guarantee Fund (ECGF) Database

The database of the ECGF is managed by the Foreign Exchange and Export Credits Department in the Central Bank of Barbados. It contains information on the financial intermediary and the associated transaction. Data was provided for all of the guarantees approved by the Central Bank from the Fund's establishment to present, that is from 2016 to 2020. In total the Fund has provided guarantees for 273 loans, benefitting 97 individual firms across a range of industries. In total 7 financial institutions have signed contracts under the ECGF. Since the Fund's inception, one commercial bank holds 60% of the fund's guarantee portfolio valued at $26,760,693 BBD as shown in Figure 1. Other refers to financial institutions who only begun accessing the fund in 2020 and as such represent just 2.2% of the guaranteed portfolio.

Figure 1: Percentage Share of Guarantees by Financial Institution



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For each ECGF guaranteed loan transaction, the database reports a series of characteristics relating to the transaction itself or the beneficiary firm (e.g., maximum guaranteed loan amount, sector, date of loan disbursement, etc.) The average loan amount disbursed for the period under consideration is $846,146.13 BBD while the average maximum guaranteed amount is $597,032.74 BBD which equal to about 71% coverage ratio. Figure 2 below depicts the average loan amount by the average maximum guarantee amount by year. In the fund's first year loan amounts were at their highest but by the second year have capped around $800,000 BBD.

"Typical" individual loans guaranteed under ECGF are much smaller in size and scope: ranging between $30,000 BBD to $50,000 BBD. Further decomposition over the years under analysis reveal that the Manufacturing($9,701,538BBD) and Heath and Medical Industries($7,523,860BBD) have benefitted most from the scheme. In 2019, one manufacturing firm was able to secure a $5.8 million BBD loan, 34% of which was guaranteed through the fund. Figure 3 below illustrates the maximum guarantee by industry from 2016-2020.

Figure 2: Loan amount & Guaranteed Amount by Year(LCU)

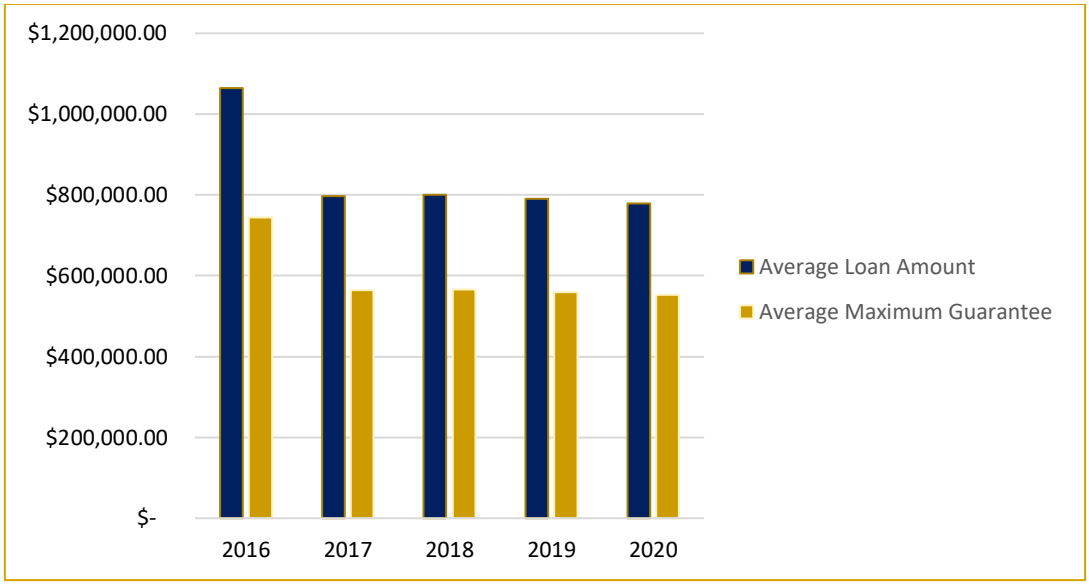

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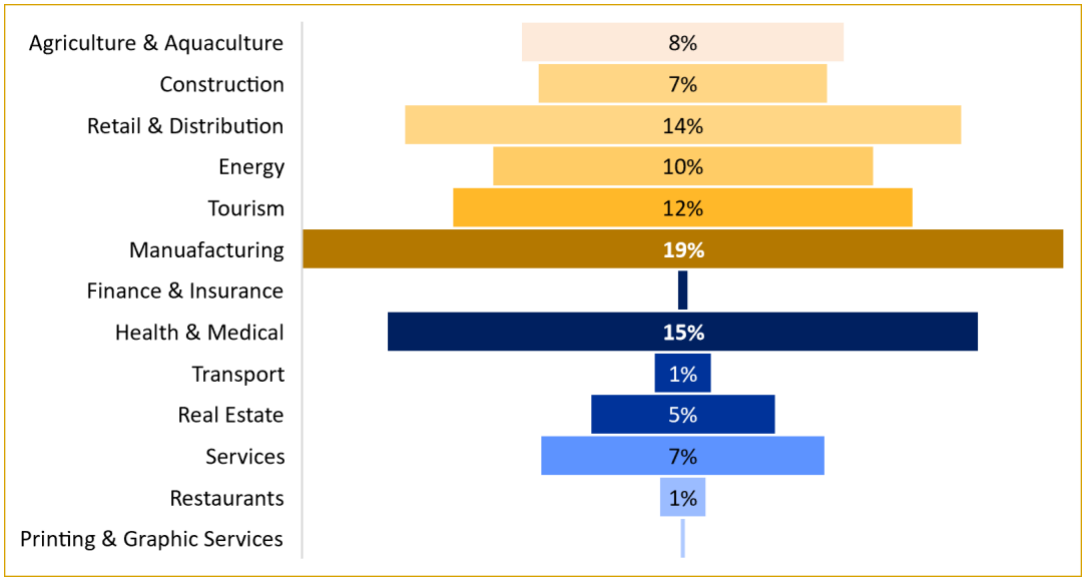
Figure 3: Maximum Guarantee by Industry by Year



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4.1.2 Collection of Company-Level Data

The company-level data used in this study was sourced from a CARICOM wide survey commissioned by the Inter-American Development Bank in 2020. Company level information was collected from businesses in 13 countries across the region on issues affecting firm competitiveness. The data also includes general information on the company such as sales and marketing, production, innovation, and the impact of COVID-19 on business operations.

For Barbados, a total of 170 companies were interviewed from the extractive and manufacturing industries and the services industry. Of the companies interviewed, 67 are microenterprises, 89 are small and 14 are medium sized to large enterprises[1].

[1] The definition of micro, small and medium sized enterprises taken from OECD Statistical glossary.

When asked if access to finance was a major obstacle to their operations, 74% of respondents agreed as depicted on Figure 4 below. However, when asked if you sought to secure a loan in the past fiscal year, (2018-2019), 91% of respondents reported no they did not apply. A follow-up question was asked to determine the reasons behind the apprehension to get a loan, 43% of respondents stated that the collateral requirements for loans or lines of credit were too high. While 27% stated that the interest rates were unfavourable. A few respondents lamented that they did not think it would have been approved. Respondents were asked what percentage of collateral is required as a percentage of the loan value by financial institutions. Figure 5 below depicts the average percentage of collateral required as a percentage of the loan value for the few firms who applied in terms of firm size. It can be seen that micro and small enterprises require more in collateral to secure a loan than medium sized firms. However, one small firm reported that 550% of the loan value was required as collateral for a loan which skews the average for the small enterprises upward.

Figure 4: Percentage of firms with financial constraints

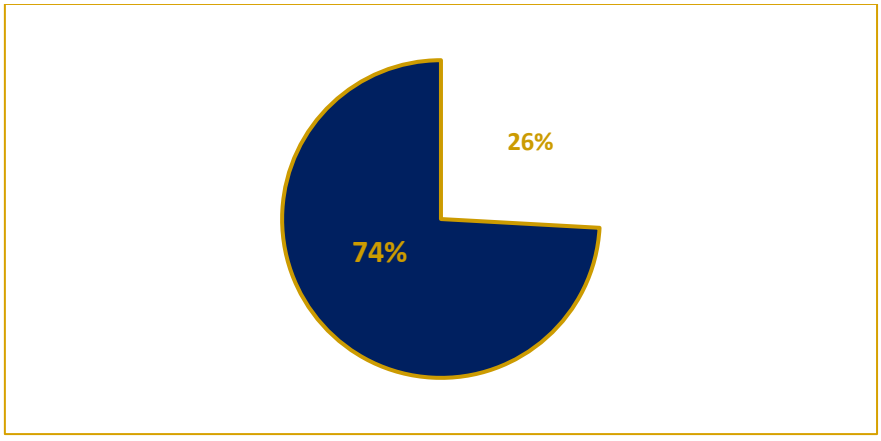

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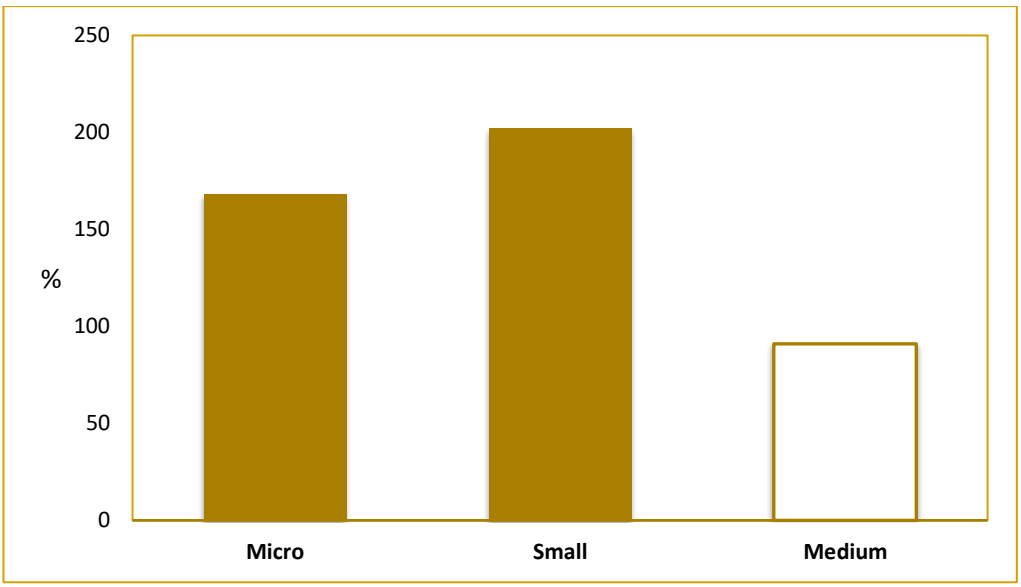
Figure 5: Average collateral required as a percentage of loan value, by firm size



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For the econometric analysis, data on overdraft facilities of firms, growth in sales, productivity and innovation were selected. Then a propensity score model was estimated to determine the average treatment effect of financial constraints on these firms.

4.2 Propensity Score Matching (PSM)

Credit guarantee programmes aim to help overcome market failures and the lack of collateral that some SMEs may encounter when attempting to finance their activities (Schich et al, 2017). Establishing causality between policy inputs and outcomes requires the construction of a valid counterfactual. In other words, what would have happened to SMEs benefitting from support if they had not received that support? In the literature, a combination of PSM and difference-in-differences (dif-in-dif) is used to compare beneficiary firms to similar firms which did not receive guarantees, the counterfactuals(Bertoni et al., 2018, 2019; Brault & Signore, 2020, 2020; Brown &

Earle, 2017; Uesugi et al., 2008). The PSM method creates a statistical comparison group of individuals without treatment that has similar observable characteristics to the individuals with the treatment (Cintina & Love, 2019).

This study employs Rubin's Causal Model (Rosenbaum & Rubin, 1983) based on the concept of potential outcome. The main implication of the potential outcome framework is that, conditional on few specific assumptions, the alternative unobservable outcome of treated enterprises, had they not received the treatment, is replaceable, on average, with the outcome of an appropriate control group (Bertoni et al., 2019). The paper attempts to determine for selected outcomes, the average effect if firms did not have financial constraints. In this way, the authors could make informed pronouncements on the potential of a credit guarantee scheme to improve firm performance in Barbados and by extension recommend the scheme be used in crisis situations to reduce illiquidity in financial markets. In the absence of firm level data for firms who received ECGF support and those who did not, this study utilises access to an overdraft facility from IADB survey mentioned above as a measure for financial constraints. Overdraft facilities are only given to firms who banks deem as being financially sound. Therefore, if a firm has an overdraft facility the assumption can be made that that firm would be more likely to receive a loan from a bank and not require a credit guarantee.

To estimate the PSM model, the treatment effect must be a dummy variable. A variable was created which equalled 1 if a firm said they had an overdraft facility and 0 otherwise. PSM also requires an outcome variable and control variables which are independent of the outcome. A total of 122 firms indicated that they do not have access to an overdraft facility while the remaining 48 said that they did. Moreover, the authors select eight outcome variables for this study. The literature has established the positive

relationship between innovation and firm performance(Atalay et al., 2013). The dataset provided data on firm spending on product innovation for 3 fiscal years. The authors created the variable '*average innovation'* by calculating the average of firm spending on product innovation for all three years. It is believed that firms who are able to spend more on research and design are usually less financially constrained.

Secondly, to capture growth in sales for firms the paper uses differenced total sales from the two fiscal years found within the database. Firms with higher growth in sales are less likely to be financially constrained because they would represent less risky borrowers by banks. The database also provided on data on COVID-19's impact on total sales for firms. Firms that are more financially constrained would have been more affected by the health crisis.

This study employed five variables related to employment since COVID-19 significantly impacted the real sector through employment of persons. Initially, a crude measure for productivity was created by dividing total sales by the total number of workers in the last fiscal year. It is believed that firms who are less fiscally constrained would be more productive than firms who are not. Then, two proxies were used to capture unemployment. Firstly, workforce, that is, total number of employees was selected. Firms who are more financially constrained are more likely to reduce their workforce in the face of financial constraints. Similarly, the data base contained data on the impact of COVID-19 on the workforce. For firms who had fewer financial constraints, were they less impacted by the crisis? Lastly, variables were included on annual average wage bill for firms, both pre- and post-COVID-19.

In total 6 control variables were chosen; firm age, if a firm was a subsidiary, firm's legal status, firm size, industry, number of competitors and percentage of sales that are exports. The older a firm, the less financial constraints they should face while

firms that are subsidiaries would have limited access to resources since they have to be shared among other subsidiary companies. The firm's legal status refers to the type of firm it is registered as if it is a sole partnership or a limited liability company. Firms that are registered as sole partnerships are expected to have greater financial constraints because they represent riskier investments to banks. Industry was included because depending on the industry, a firm may be perceived to be a higher risk borrower than a firm in another industry. Firm size controlled for whether the firm was a micro, small or medium sized enterprise. Lastly firms in industries with a large number of competitors may have slower growth in sales and exports were included to control for the variance in sales for firms who export. The results are presented in the subsequent section.

5 Empirical Results

This section illustrates the main results of our analysis. Eight equations are estimated to find the average treatment effect of financing constraints (proxied by access to an overdraft facility) on firms. The results revealed that on average, growth of sales is positively impacted by having an overdraft facility, but it was not significant at either the 5 or 10 percent significance levels. This suggests that growth in sales for firms in our sample having fewer financial constraints may not necessarily help firms perform better than firms who are more severely financially constrained. Similar results were found during the COVID-19 crisis, the treatment effect was negative but not statistically significant. The negative sign could be explained by the negative impact of COVID on sales due to the decrease in economic activity while persons were on lockdown.

Our model shows that the ATE for innovation was positive and significant at the 10% significance level. This implies that firms who had access to an overdraft facility are more likely to spend more on research and innovation. The model also revealed that the treatment effect on firm productivity is positive and significant at the 5% level of significance. The results therefore suggest that firms who have an overdraft facility are more likely to have higher levels of productivity than those without.

Lastly, we estimated four equations to capture the impact of treatment on different employment indicators. In terms of annual wages, the ATE was positive and significant at the 5% level on pre- and post-COVID wages. This implies that firms who have access to an overdraft facility were able to have higher annual wages than firms without and would have suffered less of an impact by COVID. In terms of the workforce, however, the ATE was only significant pre-COVID. This suggests that having fewer

financial constraints was not significant enough to prevent the COVID's impact on the total number of workers employed. Table 2 below illustrates our results.

Table 2: Average Treatment Effect on the Treated

ATE	Outcome Variables				
	Growth of Sales	***Innovation***	***Productivity***	***Wages***	***Workforce***
Overdraft (1 vs 0)	0.0039	2877.87**	372892.9*	4300.76*	16.2411*
	(0.01739)	(1472.296)	(87287.75)	(1630.488)	(3.6008)
ATE	***COVID Sales***	***COVID Wages***	***COVIDWorkface***		
Overdraft (1 vs 0)	-0.4549	4.4824*	0.12352		
	(9.250855)	(1.50512)	(0.44938)		

Note: The table reports treatment coefficients of the PSM matched sample, controlling for firm age, industry, legal status, exports, no. of competitors, firm size and if the firm is a subsidiary. Robust standard errors in brackets. * p<0.05, ** p<0.01, *** p<0.001.

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After completing the PSM estimation, using treatment coefficients and the mean of outcome variables, the authors conducted a scenario analysis to determine how the firms would have performed if they had access to the treatment. From this analysis the paper is able to make generalisations about the potential of credit guarantee schemes to influence firm performance based on the outcome variables chosen.

When sorted by firm size, 55 micro firms, 65 small firms and 2 medium sized indicated that they do not have access to an overdraft facility. On average, the results suggest micro and small firms would benefit more substantially from the treatment than larger firms. For instance, micro enterprises spent about $57,000 on innovation without access to the overdraft facility, if those firms would have had fewer financial constraints, we find that they could have increased their spending to about $297,123.

Furthermore, if those results were extrapolated and applied to the population of all firms in Barbados, reducing the financial constraints of firms could have led to $24 million BBD in additional investment.

Moreover, unlike innovation, the ATE's effect on growth in sales between groups was not significant. Nonetheless, the analysis shows that if the micro and small enterprises within sample had received the support of the overdraft facility, sales could have increased from 2.52 – 3.38 percentage points and 2.98 to 4 percentage points respectively. This finding is not surprising since sales growth could be explained by other factors besides access to finance. However, it could suggest that if firms had access to finance, they might be able to invest in a new capital or marketing to drive sales upward. Similar results were found for the COVID-19's impact on sales. It suggests that if firms had more readily available access to finance, the impact of COVID would have reduced by 1 percentage point on average. In contrast, for larger firms our analysis finds that the impact of COVID-19 would have been the same whether or not they had access to the overdraft. This implies that as firms increase in size, the impact of negative shocks like COVID-19 decreases.

Lastly, we considered the ATE on productivity within the sample in units of sales. The removal of financial constraints could result in significant increases in productivity across all firm groups. This could be due to firms having enough to hire more workers, pay for marketing or engage in capital investments to expand and engage in economies of scale. Table 3 below presents the results from the scenario analysis.

Table 3: ATE Scenario Analysis by Firm Size

	Micro		Small		Medium	
	Treatment=0	**Treatment=1**	**Treatment=0**	**Treatment=1**	**Treatment=0**	**Treatment=1**
Sales	2.52%	3.38%	2.98%	4%	0.09%	0.12%
Innovation	$57,840.15	$297,123	$68,357.54	$351,145.80	$2103.28	$10,804
Productivity	19,431,561	48,216,129	22,964,572	56,982,699	706,602	1,753,314
COVID Sales	-6%	-5.9%	-8%	-7.9%	-0.2%	0%

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Discussion

Financing constraints can be a significant hurdle for firms. By utilising credit guarantee schemes, these constraints could be eliminated thereby to contributing to growth in the economy. To capture the effect of these constraints, the authors estimated an Average Treatment Effect Propensity Score Matching model and conducted a scenario analysis. The results support the view that CGS can be used in Barbados to inject liquidity back into the corporate sector with the effects being immediate. In a crisis situation, for SOE's with limited monetary policy toolkits, this approach could be an effective counter-cyclical tool at the central banks' disposal.

For the most part our results were consistent with the literature. For example, Asdrubali and Signore (2015) estimate the economic impact at a financial beneficiary level of the EU SME Guarantee Facility for Central, Easter and South-Eastern European countries. The authors report that the facility on average had a significant and positive effect on firms' employment. Beneficiary firms were able to increase their workforce by 17.3%, compared to the control groups within the first 5 years following the issuance of the guaranteed loan. From our analysis, firms would have been able to increase their workforce by about 84% over the long run if they were not financially constrained. This supports the argument for CGSs, particularly during a crisis, to help firms maintain their workforce and avoid significant rises in unemployment in the economy. Furthermore the results presented are also consistent with studies by Garcia and Santor (2019) and Brown and Earle (2017) who find that guarantees have a positive effect on employment with the effect being more positive for smaller and younger firms. Similar results are reported in this study, with micro and small firms benefiting most from the treatment as well. Given that these enterprises employ the greatest number of persons in most

countries, there is enough evidence to support policy allowing CGS to target these particular firms to expand their access to finance.

In contrast to Brault and Signore (2020) who find evidence to support the use of guarantees as a policy instrument to promotes growth of SMEs, the results presented in this paper are not sufficient enough to draw this conclusion. However, it does leave room for further study in the area once data becomes available.

Instead, the study produced enough evidence to suggest that guarantees would allow for the relaxation of credit constraints, drive turnover and investment with the greatest impact on micro and small enterprises. The results suggest that reducing financial constraints for firms it could potentially result in more than $24 million in additional investment in the country on research and design alone. In small economies who are usually unable to benefit from economies of scale, research into innovation to better design and produce products that improve product effectiveness and efficiency could result in an increase in greater competitiveness for firms, particularly those who export goods and services.

In conclusion, this study was limited by the lack of firm level data related to the CGS and so proxies had to be used. Even though our results were positive and provide enough support to recommend the use of credit guarantee schemes, it cannot replace an empirical study of firms who actually received support from the ECGF.

6 Conclusion

The COVID-19 pandemic is a generation defining event and its legacy will linger for many years to come. It has generated huge losses for firms and households alike. As the role of central banks continue to evolve, continued uncertainty will force them to face difficult trade-offs as they try to return the economies to growth. This study showed that there is room for the Central Bank of Barbados to expand their tool kit to include credit guarantee schemes under certain conditions. CGSs are an effective policy tool in facilitating the flow of funds to the SMEs by diversifying risks to creditors(Kim et al., 2021). For small open economies like Barbados, CGSs can shift persistent liquidity from the banking sector to the credit constrained corporate sectors when needed to help insulate the economy from negative shocks.

This study recommends that emphasis be placed on the design of the credit guarantee scheme to reduce the central bank's exposure to risk. Firstly, by following best practices established by schemes in other countries. The Chilean guarantee scheme due to its unique design was able to use the scheme to help firms refinance loans during the COVID-19 crisis. This would be particularly suited to the situation of Barbados who is currently restricted by their debt restructuring program. By adjusting criteria, they would be able to provide timely assistance to firms without increasing their risk exposure.

Furthermore, sustainability objectives should be incorporated into the mandate of the scheme. Small island developing states stand to be the most affected by the impending climate crisis, by incorporating sustainability into their current mandate and objectives, the Central Bank would be in a better position to respond in the future. Relaxing the criteria of the current guarantee scheme to make it easier for firms who

intend to invest in projects related to the national environmental and sustainability goals should ensure the relevance of the scheme.

Lastly, this study was limited by the lack of disaggregated firm level data for beneficiary firms of the ECGF, but the results obtained are sufficient to argue that CGSs in Barbados are capable of positively impacting SMEs and by extension the economy. It also highlights areas for further research primarily into the post-performance of beneficiary firms after they receive the credit guarantee to better inform policy creation and design. As countries look ahead central banks need to be focused on maintaining macroeconomic stability with targeted and effective policies. By re-imagining and re-engineering existing tools and policies, central banks can expand their toolkits to ready themselves for the challenges and crises to come.

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