Food and Agriculture Organization of the United Nations

Impact evaluation of credit guarantee schemes in agriculture

Methodology and guidelines

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Farmer in Lanao del Sur, Philippines.

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Abbreviations and acronyms

ACGSF	Agricultural Credit Guarantee Scheme Fund
AGRA	Alliance for a Green Revolution in Africa
ALGC	Agribusiness Loan Guarantee Company
ALIDE	*Asociación Latinoamericana de Instituciones Financieras para el Desarrollo*
ARDL	Auto-regressive Distributed Lag
BoA	Bank of Abyssinia
BoK	Bank of Kigali
DCA	Development Credit Authority
DFC	U.S. International Development Finance Corporation
DFI	Development Finance Institution
DiD	Difference-in-Difference
ED	Encouragement Design
EIF	European Investment Fund
ESP	Social Policies and Rural Institutions Division of FAO
FAG	*Fondo Agropecuario de Garantìas* (Colombia)
FAO	Food and Agriculture Organization of the United Nations
FdG	*Fondo di Garanzia per le Piccole e Medie Imprese* (Italy)
FIs	Financial Institutions
FJMC	José Maria Covelo Foundation
FNG	*Fondo Nacional de Garantìas*
FOGAPE	*Fondo de Garantía para Pequeñas Empresas* (Chile)
FONAGA	*Fondo Nacional de Garantìas de los Sectores Agropecuarios, Forestal y Rural* (Mexico)
FSPs	Financial Service Providers
GIZ	*Deutsche Gesellschaft für Internationale Zusammenarbeit*
IFAD	International Fund for Agricultural Development
IFC	International Finance Corporation
IV	Instrumental Variable
KfW	*Kreditanstalt für Wiederaufbau*
KYC	Know-Your-Customer
M&E	monitoring and evaluation
MFI	Microfinance Institution
MSMEs	Micro-, Small- and Medium-sized enterprises
OD	Oversubscription Design
OECD	Organization for Economic Cooperation and Development
OLS	Ordinary Least Square
OPIC	Overseas Private Investment Corporation
PASS	Private Agriculture Sector Support Program
PCGS	Partial Credit Guarantee Scheme
PSM	Propensity Score Matching
RCT	Randomized Control Trial
RDD	Regression Discontinuity Design
RISE	Rural Institutions, Services and Empowerment Team of FAO
SAGF	Sustainable Agricultural Guarantee Fund
SMEs	Small- and Medium-sized Enterprises
UNCDF	United Nations Capital Development Fund
USAID	United States Agency for International Development
VAR	Vector Autoregression
WFP	World Food Programme
WWCLEG	What Works Centre for Local Economic Growth

CURRENCIES:

CLP	Chilean peso
EUR	Euro
NGN	Nigerian Naira
USD	United States Dollar

Farmer cultivating mung beans in Makueni, Kenya.

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Section 1

Introduction

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1.1 Background: Credit guarantee schemes and their role in agriculture

The existence of a sizeable financing gap for Small and Medium-Sized Enterprises (SMEs) in the developing world is a well-known and documented phenomenon. As of 2017, 65 million (or 40 percent) of SMEs in emerging markets were either unserved or underserved by formal financial institutions (FIs), with a resulting finance gap estimated to be close to USD 5.2 trillion[1] (or 1.4 times the global level of lending to small- and medium-sized enterprises (SMEs) at the time) (IFC, 2017).

Partial credit guarantee schemes (PCGSs) are a common form of government intervention to unlock finance for SMEs, with more than a hundred countries worldwide having instituted a PCGS for this specific purpose. A PCGS provides third-party credit risk mitigation to loan providers through the absorption of a portion of the lender's losses on the loans made to SMEs in case of default, usually in return for a fee.

Public PCGSs are an **important asset in governments' public policy toolkit**, especially when attempting to curb the effects of cyclical downturns and financial crises on the existing financing gap for SMEs. In times of financial stress, the supply of credit available to SMEs is usually reduced due to various reasons, including the weakening of banks' capital and liquidity provision, as well as the increased moral hazard and adverse selection faced by banks when it comes to SME lending. **Given that demand for credit usually declines during cyclical downturns**, Since in cyclical downturns the demand for credit is also likely to diminish, it can often be quite challenging to disentangle the relative role of demand- and supply-side factors in an observed reduction in the credit flows to firms.

For these reasons, public PCGSs saw a notable expansion in the aftermath of the 2008/09 global financial crisis, as several countries[2] made ample use of these facilities to compensate for reduced levels of lending on the part of the private banking sector. Several countries strengthened their already existing guarantee schemes, with notable increases in the total amount of funds available, the number of eligible firms, the percentage of the loan guaranteed and/or the size of the guaranteed loan. In others (e.g. Ireland, United Kingdom), new facilities of this kind were introduced, with specific development objectives embedded in their mandates. In short, **the use of PCGSs as a countercyclical policy tool during the financial crisis** led to a significant increase in their scale and scope.

[1] USD = United States Dollar.

[2] These include Canada, Chile, Finland, France, Germany, Greece, Japan, the Republic of Korea, Malaysia, the Netherlands and the United States.

A sizeable number of public PCGSs have been explicitly instituted to enable lending to SMEs located in rural areas. A sub-set of this category consists of guarantee schemes that have the specific mandate of **fostering financing for enterprises active in the agricultural sector**. Examples of agriculture-specific PCGSs of this kind include: the Agricultural Credit Guarantee Scheme Fund (ACGSF) in Nigeria; the Private Agriculture Sector Support Program (PASS) in Tanzania; the *Fondo Agropecuario de Garantìas* (Agricultural Guarantee Fund) (FAG) in Colombia; and the *Fondo Nacional de Garantìas de los Sectores Agropecuarios, Forestal, Pesquero y Rural* (National Guarantee Fund for the Agricultural, Forestry, Fisheries and Rural Sectors) (FONAGA) in Mexico. Apart from public schemes, agriculture-focused PCGSs have also been established as part of private sector initiatives, or as public-private collaborations (see Box 1 at the end of this section).

PCGSs are commonly perceived as a policy tool that can play an important role in enhancing credit flows in a sector – agriculture – that faces a wide number of **intrinsic barriers to financial provision**, both from the side of the demand for credit (i.e. SMEs across different segments of agri-value chains) as well as from that of the offer (i.e. banks, and an array of other financial providers).[3] In principle, by absorbing a portion of the losses on the loans made to SMEs in case of default, PCGSs can foster access to formal credit for those agricultural firms that would not be considered for financing under normal circumstances. From the side of the offer, PCGSs can lower the risks associated with agricultural credit portfolios for financial providers, supporting a more systematized engagement of these actors in the sector over time.

Nevertheless, as will be seen throughout this study, the existing literature presents **mixed evidence on the effects that PCGSs can have** as a tool to enhance credit flows to SMEs and improve the loan terms and conditions offered to them. Multiple studies (analyzed in Section 4 of this document) have pointed to **the risk of guarantee schemes increasing moral hazard** for clients and financial providers alike, reducing clients' willingness to repay the loan and the providers' incentives towards maintaining strict screening of client profiles. Financial institutions could leverage the guarantee scheme's support to provide higher risks loans to firms, solely because the facility is backing this option, thereby increasing default rates in their portfolios.

Most importantly, even less definitive empirical evidence is available on the **longer-term impact these facilities can have** on firm-level performance indicators (such as employment, sales and assets) and indirectly on the broader economy. Therefore, while PCGSs are normally implemented to pursue a number of social and economic objectives, there is little empirical

[3] In terms of demand, constraints that agricultural SMEs face include a general lack of conventional collateral for credit; poor credit history; low financial education; high geographical fragmentation; and lack of longer-term financing, among other major constraints.

From the side of the offer, formal financial providers – especially in developing and emerging contexts – are limited in their engagement in the agricultural sector due to: lack of expertise in agriculture (and related risk appraisal methods); high systematic and firm-level risks intrinsic to the sector; scarce access to insightful information on agricultural value chains; lack of a supportive regulatory environment; and – as a consequence of all these issues – a general institutional bias against agricultural lending, which is perceived as too risky and unprofitable.

justification regarding why these schemes should be preferred over other kinds of development intervention. Moreover, the very mandates associated with these facilities (i.e. the precise – and quantifiable – objectives that the PCGS is supposed to pursue) are often left vague and undefined by their creators, which further complicates the process of trying to empirically demonstrate whether these schemes are in fact achieving their institutional goals.

Box 1 Private and non-profit sector involvement in agricultural guarantee schemes

Apart from state-operated mechanisms, agriculture-focused PCGSs have also been established in several instances by the business community (such as banks or chambers of commerce), or as hybrid schemes in public-private partnerships. These corporate guarantee schemes can rely on the financial specialization of experienced corporate leaders, and they can derive substantial benefits from the direct involvement of the banking sector. Relevant examples of PCGSs of this kind include the Bank of Tanzania's SME Credit Guarantee Scheme and the Rabobank Sustainable Agricultural Guarantee Fund (SAGF) in the Netherlands.

Furthermore, PCGSs can also be the result of the engagement of development finance institutions (DFIs), development cooperation agencies, foundations or other large donors. These facilities usually combine the provision of guarantee with extended technical assistance to target firms and to drive uptake and sustainability, and often take the form of public-private partnerships. Relevant examples in the agricultural sector include the *Kilimo Biashara* scheme in Kenya, which is the result of a partnership between Equity Bank, IFAD, Alliance for a Green Revolution in Africa (AGRA) and the AGRI Guarantee Facility, managed by the European Investment Fund.

1.2 Rationale and purpose of the publication

While a considerable amount of literature has been produced in recent decades regarding the overall experience of using PCGSs to overcome the credit gap in developing agriculture, there is still a lack of **structured and rigorous empirical evidence** demonstrating the concrete impact of PCGSs specifically established to unlock financing for agricultural SMEs. Most available case studies only provide a **descriptive analysis** of the results, constraints and features of agriculture-specific PCGSs, while lacking an impact evaluation (IE) approach (either fully experimental or quasi/non-experimental) whose findings could also be used to properly inform the design of future facilities and related policies.

Box 2 Impact evaluation in development

According to the definition provided by the World Bank, an impact evaluation is a collection of estimation strategies that assesses the changes in the well-being of individuals, households, communities or firms that can be attributed to a particular project, program, policy or facility. The central question in impact evaluation is what would have happened to those receiving the intervention if they had not in fact received it. Since we cannot observe this group both with and without the intervention, the key challenge is to develop a counterfactual – that is, a group which is as similar as possible (in observable and unobservable dimensions) to those receiving the intervention. This comparison allows for the establishment of definitive causality – attributing observed changes in welfare to the program, while removing confounding factors (World Bank, 2009).

Nowadays, most studies that focus on assessing SME development interventions (such as a PCGS) involve qualitative surveys of beneficiary firms and financial institutions **which are not very informative about whether such programs are actually working**. While important for a number of purposes (such as measuring satisfaction with services provided or identifying areas of program design and implementation for improvement), these studies cannot provide reasonable estimates of the net impact of an intervention. This would require **knowledge of the counterfactual**, i.e. what outcomes would have resulted if the scheme had not been implemented. The beneficiaries of the scheme can only make guesses about this counterfactual, or they may provide responses that they think survey enumerators want to hear. That is the reason why an impact evaluation methodology (see Box 2 for its precise definition) can be quite effective – provided that all necessary elements are in place – in measuring the effects of a PCGS's intervention in the agricultural sector[4] (Lopez-Acevedo and Tan, 2010).

This working paper has been developed to assist in overcoming the current gap in empirical data on the impact of agricultural PCGSs, by providing interested readers (whether policymakers, academics, practitioners from development agencies or other stakeholders) with key information on technical and operational aspects of impact evaluations of PCGSs in agriculture, as well as recommendations on the feasibility of carrying out such evaluations with the aim of generating evidence on a more systematic basis. The hope is that public stakeholders interested in carrying out a proper IE of an agriculture-focused PCGS can use the materials provided by this publication **as a reference point for their work**.

[4] The critical importance of robust IEs for the design and management of public PCGSs has been explicitly affirmed in the "Principles for Public Guarantee Schemes for SMEs" developed by the World Bank and the FIRST Initiative (2015). Principle 16, in particular, states that *"the performance of a PCGS should be and periodically evaluated, and the findings from the evaluation publicly disclosed."*

Specifically, the document aims to pursue the following **objectives:**

- Provide a comprehensive methodological review of the issues related to carrying out **impact evaluations (IEs) of agricultural PCGSs**, ranging from the possible techniques that can be used to carry out the assessment and the core constraints to overcome to the choice of evaluation objectives, as well as a host of other methodological considerations. **Section 2** of this document aims to establish this type of methodological groundwork;
- Underline which unique constraints would be faced by an evaluation team when seeking to carry out an impact evaluation of a PCGS **in the agricultural sector**, highlighting the additional barriers that stem from the specific features that usually characterize these types of sectors in developing contexts. **Section 3** of this document focuses on this analysis;
- Provide a review and analysis of **relevant past studies** that have employed a variety of methodologies to evaluate the impact of PCGSs supporting SME lending, presenting the evaluation model employed in each specific case, as well as an array of considerations related to data access and quality, resources, timing, constraints, context, resulting evidence and other aspects. **Section 4** of this document presents this review;
- Provide a review of existing assessments of the results of agriculture-focused PCGSs which, **while lacking the methodology and robustness to be classified as proper IEs**, can provide interesting insights regarding the kinds of results and conclusions achieved so far in the existing literature, as well as detailing the current lack of hard (and undisputable) data derived from the absence of proper IEs targeting this specific kind of agriculture-focused facility. This is featured in **Section 5**;
- Provide a series of operational considerations regarding the development of a **systematized approach** to carry out IEs of agricultural PCGSs, in **Section 6**, presenting readers with an overview of the type of technical and operational requirements (e.g. in terms of timing, costs, expertise and most appropriate IE methodology) required to perform these evaluations in a structured manner.

As will be illustrated in the concluding remarks in Section 6, the main recommendation from this study is to focus on a number of specific **non-experimental methodologies for impact evaluation** to develop a systematized approach to assess agricultural PCGSs. These methodologies, which include regression discontinuity designs, difference-in-difference and propensity score matching, employ a range of statistical techniques to establish a solid counterfactual and assess the impact of an intervention **after it has taken place**, in the (likely) scenario that experimental approaches are not a feasible option. Section 2.4 of this study presents an overview of these types of non-experimental methodologies.

As the evidence will show us, **the systematic realization of fully experimental, randomized control trial (RCT)-based impact evaluations** of agricultural PCGSs is an extremely challenging endeavor in the current scenario, given the range of contextual factors that must be present on the ground to enable these kinds of assessments, as well as the substantial financial and technical requirements associated with these evaluations.

Section 2

Methodological considerations related to impact evaluation of credit guarantee schemes

Young farmers visiting a herbs and spice farm in the frame of a FAO project (Kamburu, Kenya).

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This section aims to present a series of fundamental methodological considerations related to the impact evaluation of PCGSs which are necessary to lay the foundation for the subsequent analysis of the case studies reviewed in this study. To begin with, it is essential to underline that, within the existing literature on credit guarantee schemes, there are usually **four possible objectives** against which evaluations of PCGSs can be undertaken (OECD, 2017), albeit the dividing line between the concepts is not always clearly defined:

1. **Financial additionality**, which is reflected in incremental credit flows to SMEs and/or improvements in loan terms and conditions. This concept relates to the **intermediate outcomes** set within the PCGS's mandate, and it is analysed in Section 2.1.

2. **Economic additionality**, which refers to longer-term economic effects, for example to the effects on variables such as employment, turnover, sales and probability of default, which might have been influenced causally by the credit guarantee. This concept relates to **policy outcomes**, and it is analysed in Section 2.2.

Impact evaluations focus, at their core, on assessing the contribution of PCGSs to performance indicators related to these two additionality concepts. The establishment and analysis of a **proper counterfactual** is necessary to demonstrate the presence of an impact in this sense. Sections 2.1 and 2.2 below analyse the definition and application of these concepts in more depth. Furthermore, the following two elements should also be part of an evaluation:

3. **Financial sustainability**, which refers to the ability of the scheme to cover the costs of its operations and defaults, as well as to absorb losses and maintain an adequate equity base. It is usually assessed through the analysis of the leverage ratios (outstanding guarantees to equity) and the net loss ratio (payment of claims/outstanding guarantees) (Vienna Initiative, 2014). While it could be argued that this specific concept is considerably easier to demonstrate empirically than the previous two, given that it does not require the establishment of a counterfactual, few of the studies specifically considered in this review focused on demonstrating the financial sustainability of PCGSs, most likely because the majority of the IEs available in the literature focus on public facilities for which financial sustainability does not represent a primary objective.

4. **Outreach**, which refers to the capacity of the guarantee facility to meet the demand for guaranteed loans by SMEs. Outreach should be measured, at the very least, by the number of guarantees issued to eligible firms and by the amount of outstanding guarantees. It is important to underline that **outreach is not a measure of impact**, as increased use of a guarantee facility does not necessarily beget increased financial additionality for beneficiary SMEs (Vienna Initiative, 2014).

In fact, multiple studies point to a **fundamental trade-off** between the outreach of a guarantee scheme and its financial additionality. As a guarantee facility lowers the price it charges on the loan principle and increases the coverage ratio of its loans, the participating banks will place

increasing reliance on the PCGS to back the loans they provide to beneficiary SMEs. However, this increase in the use of the facility will have derived in part from the coverage of lower-risk loans which banks **would have provided anyway** even if the PCGS had not intervened. In other words, the PCGS generates less financial additionality as it extends its outreach. As will be seen in Section 2.2, this has important ramifications in terms of the **potential higher risk of default for beneficiary SMEs**, due to higher-risk loans being provided by the banks as a direct consequence of the PCGS's intervention (KfW, 2015; OECD, 2017).

2.1 Assessing the financial additionality of credit guarantee schemes

A fundamental question which needs to be answered when attempting to assess the impact of a PCGS is to which extent it is able to achieve **financial additionality**. In other words, whether a scheme is capable of strengthening the credit flow directed at SMEs – as well as improving the terms and conditions of the credit offered[5] – compared with what would have happened in the absence of such a scheme. Assessing financial additionality is required to evaluate whether the PCGS is achieving its **intermediate outcomes,** i.e. the objectives set within the PCGS's mandate in terms of direct impact on the target SMEs (e.g. change in number of firms receiving credit, cost of credit, amount of aggregate and individual bank debt). It is evident that if no real financial additionality for SMEs can be demonstrated, it would be hard in practice to justify the continued existence of a PCGS (KfW, 2015; De la Torre, Gozzi and Schmukler, 2017).

From an empirical point of view, it can be quite challenging to properly assess the increased amount and quality of loans to SMEs generated by a PCGS, especially because establishing the counterfactual baseline can be extremely hard in practice. Ideally, employing **a fully experimental RCT-based approach** to establish the counterfactual would require comparing a group of SMEs that have been randomly selected to participate to the scheme with another control group (composed of firms that, ideally, share similar characteristics) that cannot benefit from it. If selection is really independent of SMEs' characteristics, then the difference in the credit flow and quality between the treated and control groups could be attributed to the changes generated by the treatment, and not to pre-existing differences already present between the two groups of SMEs.

[5] It is important to underline that the concept of financial additionality does not only encompass the increase in the number of loans extended to SMEs, but also the various beneficial effects that a PCGS can have in terms of extended maturity, volume and quality of loans made available.

Fully experimental RCT-based evaluations represent the "gold standard" for IEs of PCGSs, as when correctly designed and implemented, they can provide unbiased estimates of the impact of a scheme, and can be performed even in the absence of detailed baseline data. In reality, though, as pointed out by a recent World Bank (2018) publication, RCT-based IEs of a PCGS are a feasible option only when a **very strict set of conditions** exists on the ground. The following are all necessary elements that must be in place for an experimental approach to be realizable:

1. RCT-based IEs are **prospective** in nature: their development has to be integrated within the design and implementation of the guarantee scheme itself, with the IE unfolding in tandem (through a phased approach) with the beginning of the PCGS's operations. For this reason, timely and accurate **planning** of the IE has to be ensured, as this represents a key element in any evaluation seeking to include a random assignment mechanism in its design.

2. This means, among other things, that the randomization of the treated and control groups has to be performed before the PCGS begins its operations. The conditions to access the scheme must make it feasible to assign participants to the treatment and control group;

3. It must be possible to have access to a large enough pool of participating firms to allow for meaningful statistical analysis. This might not be possible in the case of smaller guarantee facilities;

4. The collection of robust baseline data (i.e. prior to the PCGS intervention) on both the treated and control groups, as well as on the macro-level scenario (e.g. in terms of region, industry, sector) has to be possible;

5. It must be easy to follow both the control and treated firm groups over a long period of time, in the context where the PCGS is active, to obtain regular and accurate data on their performance outcomes (White and Raitzer, 2017).

6. It must be possible to carry out the IE within a very specific timeframe following the start of the PCGS's operations, and it is important that this is not undertaken at too early a stage (Section 4.1 will focus more specifically on aspects related to timing). This is necessary to allow for new incentives, firm-level decisions, and a variety of different financial and economic mechanisms to unfold over time in the aftermath of the implementation of a PCGS. Economic additionality is typically associated with second- or even third-order effects caused by such initial changes, depending on the indicators of interest (e.g. enterprise sales, employment, profit, increases in capital assets and so forth). The timing of impact evaluations needs to take these factors into account.

Even when all these conditions are met, RCT-based IEs remain quite a **costly endeavor**, given the breadth, length and technical requirements of such undertakings. **Implementation** is usually far from perfect as well, as a RCT can experience all sorts of setbacks, such as contamination, attrition (i.e. when participants drop out of the study) or other issues that can affect the random assignment, thus making data analysis quite complex. Given all these challenges, it should not

come as a surprise to note that, as of the time of writing, **no evidence exists of a RCT ever being carried out to evaluate the impact of a credit guarantee scheme** (World Bank, 2018).

Therefore, even though a fully experimental IE methodology represents an "ideal" setup from an evaluator's point of view, in the context of most PCGSs this approach **is not viewed as a feasible option**, given the technical, financial, political, and other structural and contextual challenges that limit its applicability. Furthermore, the vast majority of IEs are in fact carried out after the implementation of the guarantee scheme has already started (i.e. a "retrospective" evaluation), which excludes the possibility of an experimental approach as the treated and control group have to be generated *ex post*.

When analysing the impact of a PCGS on a group made up of SMEs that have not been selected through a fully experimental approach, it is vital to remember that, in reality, **guarantees do not get assigned to firms in a completely randomised manner**. Firstly, only those enterprises that apply for a loan guarantee have the possibility of obtaining it; secondly, applicants have to meet certain criteria in the first place to be selected for the guarantee program. Hence, as it is more likely that better managed firms (with a higher growth potential) will obtain a guarantee, it is obvious that any identified difference between the treated and control group cannot just be attributed to the estimated effect of the PCGS by itself, but also to the intrinsic differences (both observable and non-observable) that set apart the two groups. Thus, ensuring that these differences are controlled through appropriate statistical techniques is fundamental, otherwise the estimated impact of the PCGS will be subject to what is known as the **selection-into-treatment bias** (OECD, 2017).

In these instances, analyzing the counterfactual demands for more refined, non-experimental statistical methods than the simple comparison of the outcomes associated to both the treated and control groups. The most popular non-experimental statistical approaches which are used in literature to assess the impact of PCGSs are illustrated in Section 2.4.

2.2 Assessing economic additionality

Beyond the financial perspective, assessing **economic additionality** – the longer-term impact on the economic welfare that the PCGS generates – is an even more complex challenge. Economic additionality implies, first and foremost, an assessment of the impact of the increased rates of credit access on a range of performance-related aspects of the beneficiary SMEs, such as increased growth, investment in working and fixed capital, employment, sales and probability of default. Beyond that, assessing economic additionality also requires an understanding of whether, from a macro perspective, the implementation of the PCGS has generated **positive spillover effects** on the overall economic growth of a region or country. An issue deriving from this is that those SMEs that receive PCGS-supported loans (and grow thanks to having

increased access to credit) could in fact **displace other firms** that were not provided with guarantees, which might end up generating little or no aggregate effects on macro-level economic aspects such growth or employment (KfW, 2015).

Assessing economic additionality, despite the challenges associated with it, is essential in understanding whether the **policy outcomes** expected by a public PCGS and embedded within its mandate (such as increased rates of employment creation as a result of loan guarantees) have been properly achieved. From a methodological perspective, the core challenge with this lies in identifying, filtering and properly demonstrating **the causal impact of PCGS interventions**, especially in terms of the achievement of social goals, which is considerably less straightforward to prove. This challenge is compounded by the fact that the very same policy objectives embedded within a PCGS's mandate are often left quite vague and undefined by the designer (whether a public legislator, or otherwise), which complicates the assessment of whether the facility is actually achieving its mission (OECD, 2017).

From a broad review of the available literature on impact evaluation of PCGSs, it can be evinced that while there is nowadays considerable evidence regarding the positive impact that PCGSs have on increased quantity and quality of firm credit (i.e. financial additionality),[6] **insufficient evidence is available in terms of the economic additionality generated by these facilities**. The ambiguity in these results can be attributed to a number of causes, such as the different methodologies used for the analysis, the range of diverse outcome measures used in the performance assessment and, chiefly, the different contexts in which the schemes operate. The review of cases in Section 4 provides a few examples of different retrospective IEs that provided mixed results in terms of the economic additionality of specific schemes.

For example, there is some evidence that guarantee facilities can have positive long-term effects on employment levels,[7] while results are more ambiguous in terms of the impact on investment and firm sales,[8] as well as productivity.[9] This ambiguity is compounded by the relative scarcity of IEs focusing on demonstrating economic additionality, as opposed to only financial additionality.

Several studies also point to the fact that, unless the rules and procedures for guarantee eligibility are defined and managed in an appropriate manner, PCGSs **can potentially increase the risk of default** for the beneficiary SMEs. This is caused by banks opting to use a PCGS to provide higher risk loans to firms (as they are associated with a higher expected profit), even in instances where they would have in fact been able to provide a loan that was lower risk and thus not backed by the facility. This is a clear example of a **lack of financial additionality**, as the scheme is not in fact increasing the loan volume compared with what would have been provided in its absence. Hence, during the design of a PCGS, particular attention should be paid

[6] In relation to financial additionality, see, for example: OECD, 2017; Alvarez, Belmar and Opazo, 2015; D'Ignazio and Menon, 2012.

[7] See, for example: OECD, 2017; Vienna Initiative, 2014, Annex 1.

[8] See, for example: De Blasio *et al.*, 2017; Kang and Heshmati, 2008.

[9] See, for example: Arraiz, Melendez, and Stucchi, 2014; OECD, 2017.

to the specific arrangements behind the assignment of the guarantees on the part of the facility, as the expected benefits in terms of economic additionality (such as on employment or sales) need to be balanced with the potential increase in probability of default for the beneficiary firms (KfW 2015; Arráiz, Melendez and Stucchi, 2014; Zecchini and Ventura, 2006).

2.3 A framework for the categorization of impact evaluation methodologies

A recent study by the Organization for Economic Cooperation and Development (OECD) (2017) proposes a five-level categorization framework[10] to rank the robustness of impact evaluations of PCGSs in terms of the establishment of a robust counterfactual (see Box 3 at the end of this section for more info on the original OECD study). The author chose to adopt this framework for the present review given the clarity it provides in categorizing different assessment methodologies for PCGSs. Table 1 below presents a summary of the main features of the different levels, with Level 1 being a mere descriptive analysis of the PCGS's performance – with no attempt at establishing a proper counterfactual – and Level 5 being a fully randomized impact evaluation which, albeit ideal, is challenging to carry out in reality due to the considerations illustrated in Section 2.1.

Table 1 **Ranking of impact evaluations of PCGSs according to robustness of counterfactual**

<table>
<tr><th rowspan="2">Level</th><th colspan="2">Building of the counterfactual</th><th rowspan="2">Quantitative tools</th></tr>
<tr><th>Treated vs. control group</th><th>Control variables</th></tr>
<tr><td>1</td><td rowspan="2">Either no distinction, or distinction but without proper counterfactual
(i.e. not an impact evaluation)</td><td rowspan="2">None or inappropriate choice</td><td>None (qualitative study), or econometric modelling that does not establish a counterfactual</td></tr>
<tr><td>2</td><td rowspan="3">More sophisticated analytical methods (e.g. DiD, PSM, RDD, IV. See next section)</td></tr>
<tr><td>3</td><td rowspan="2">Distinction between treated and control groups to build a counterfactual
(i.e. a non-experimental impact evaluation)</td><td>Basic regression on control variables to build a counterfactual (age, sector, geographical location etc.)</td></tr>
<tr><td>4</td><td>Statistical tool or evaluation designs that allow for near randomization in order to construct the counterfactual (e.g. RDD)</td></tr>
<tr><td>5</td><td colspan="2">Fully randomized experiment
(i.e. an experimental impact evaluation)</td></tr>
</table>

Source: OECD, 2017.

[10] This framework is adapted from the *What Works Centre for Local Economic Growth* scoring table for impact evaluations, based on the Maryland Scientific Method Scale. See: What Works Centre for Local Economic Growth, 2016.

It is essential to underline that **availability of data** majorly affects the ability to construct a reasonable counterfactual and develop robust IEs that rank highly in the framework presented above. In the case of a fully randomized IE of a PCGS (i.e. Level 5 in the framework), the issue of data collection will have to be elaborated and addressed during the preparatory phase of the PCGS itself (i.e. during the design phase, and well before the scheme starts its operations). On the other hand, in the case of a non-experimental IE, the ability to access **a combination of existing datasets** – capable of providing extensive and long-term data at firm and aggregate level – will significantly increase the quality and effectiveness of the statistical techniques employed, thereby achieving a more robust approximation of the counterfactual.

It is also important to mention the critical importance that **administrative data** can have for the realization of robust IEs of PCGSs. The long-term data on enterprises collected by public institutions such as central banks, Ministries of Economy and credit bureaus can provide evaluators with essential information on a series of firm-related characteristics such as loan activity, interest rates, default, sales, assets and employment, all of which represents a fundamental complement to the monitoring and evaluation (M&E) data collected by the guarantee facility itself. Furthermore, as data collection represents the highest expense required to perform an IE of a PCGS, being able to leverage extensive administrative data can significantly reduce the resources needed to perform assessments of this kind (World Bank, 2018).

Box 3 A note on Organization for Economic Cooperation and Development (2017)

The aforementioned 2017 OECD study, *"Evaluating publicly supported credit guarantee programmes for SMEs"*, reviewed 23 impact evaluations of public PCGSs in OECD countries. Among these, only one was categorized as a Level 4 study according to the framework (i.e. achieving *quasi-randomization* to build a counterfactual), while 14 ranked at Level 3. To guarantee a broader coverage in terms of countries where the PCGSs were established, as well as the types of relationships investigated, the review also included six studies classified as Level 2, which made use of fairly refined quantitative tools but did not adequately build the counterfactual, and therefore could not be classified as Level 3 (OECD, 2017).

Two main elements of note need to be underlined in this case: 1) the OECD review could not find any available study that could be said to rank as Level 5 (i.e. full randomization of program participation), due to the constraints delineated in Section 2.1 related to performing fully experimental IEs of PCGSs; and 2) the majority of the analysed studies were ranked at Level 3 in the framework, which is a clear sign of the challenges (in terms of data availability, planning and contextual elements) associated with achieving *quasi-randomization* in an impact evaluation (i.e. Level 4 in the framework). The following section provides a more in-depth look at the various methodologies to approximate the counterfactual in an IE.

2.4 Non-experimental approaches to establish and analyze counterfactuals

As mentioned in the previous section, several statistical methods allow the establishment of a counterfactual and the carrying out of rigorous impact evaluations even in the likely case that full randomization of treated and control groups cannot be feasibly achieved during the planning phase of a PCGS, or when seeking to carry out a **retrospective evaluation** of an already existing PCGS. Overall, these non-experimental approaches can be divided in two main categories:

1. **Quasi-experimental methods.** These approaches include propensity score matching, difference-in-difference (DiD) and regression discontinuity designs, which are further described below. These methods rely on establishing a control group that is as similar to the treated group as possible, and then employing statistical techniques to isolate the impact of the PCGS. In other words, the treated and control groups are balanced, which means that the average values of observable characteristics are approximately the same. Impact is calculated as either the difference in outcomes after the intervention, or the difference in the differences in outcomes between baseline and endline. To further reduce the selection bias, the differencing is usually combined with some type of matching technique (White and Raitzer, 2017).

2. **Regression-based approaches.** These methods do not establish an explicit comparison group, though the data must include observations on untreated units. They include instrumental variables, endogenous treatment models, endogenous switching regressions and fixed effects models. Regression-based approaches are based on specifying the underlying structural model, that is, the set of behavioural relationships which lead to program impact. This structural model embodies the theory of change. Hence, the estimation of the parameters of the model can be a useful component of causal chain analysis, based on a theory of change (White and Raitzer, 2017).

Within these two categories, **four methodologies** have been commonly used in the literature to carry out IEs of PCGSs, and these are illustrated below. Relevant cases and IEs using these methodologies will be presented and analyzed in depth in Section 4.

Difference-in-difference (DiD). DiD is a *quasi-experimental* method which makes estimates based on the difference in the changes in the outcome between treated and control groups over time. The general idea of the DiD method is to estimate the effect of the intervention of the PCGS by considering first the difference in the value of the outcome variables **before and after** the PCGS starts operating for the beneficiary SMEs, and then the difference **between beneficiaries and non-beneficiaries** (treated and control group):

$$DiD\ Effect = \Delta t Treated\ group - \Delta t Control\ group$$

The main advantage of the DiD method is that it allows the evaluators to control for biases caused by both observed and unobserved firm-level characteristics that do not vary over time. It also allows the evaluators to control for general trends (observable and non-observable) that vary in time and affect all enterprises in the same manner (such as inflation, business cycle, exchange rate or any shock that affects the economy as a whole) (Arráiz, Melendez and Stucchi, 2014).

It is evident that DiD estimates require substantial baseline data that should be collected immediately before the implementation of the PCGS to be assessed. If that is not possible, it could still be reasonable to use baseline data collected in the first months of the PCGS's start-up period, when the facility has yet to generate any impact through its operations.

The key assumption in a DiD analysis is that in the absence of the treatment, the change in outcomes for the treated group **would be identical** to the change in outcomes for the control group. While this assumption is not formally testable, its validity should always be carefully examined to ensure that the DiD impact is not biased. If there is available data spanning several years before the treatment, then one easy way to assess the validity of the equality of trends assumption is whether pre-treatment trends were equal between the two groups. It is also useful to control for baseline observable firm characteristics between the treated and control groups.

Assessing impact through a DiD approach **might still result in selection-biased estimates** if the firms in the control group differ significantly from those in the treated group (i.e. they are not balanced on the *observed* covariates). That is why, in the literature, the DiD technique has been often paired with the propensity score matching method, as this allows the evaluators to identify treatment effects in a *selection on observables* context. In other words, while DiD takes care of any unobserved, time-invariant characteristics, propensity score matching ensures that the treated and control groups are statistically equivalent according to observable characteristics.

Propensity score matching (PSM). The PSM method seeks to pair SMEs in the treated group with those in the control group that show similar values on the *propensity score* (the conditional probability of being assigned to a particular treatment given a vector of observed variables), discarding all the unmatched units and thus controlling for biases. Hence, PSM can be employed to identify a control group that is statistically equivalent to the treated group, with the impact of the PCGS then being measured as the difference in outcomes between the two groups. Given that there are several dimensions along which an evaluator might want to match SMEs (such as firm size, profitability or leverage), the PSM method can be used to incorporate a wide number of different variables, providing a natural weighting scheme that provides unbiased estimates of the impact of the PCGS in the sample (World Bank, 2012, 2018).

The PSM method is associated with a series of challenges. First, it is *data intensive*, as it requires a large enough dataset, or multiple datasets, in order to properly identify a control

group that is statistically equivalent to the treated group (i.e. it must contain enough information to adequately estimate propensity scores for each SME). This also implies being able to access substantial baseline data. Furthermore, PSM by itself is not an appropriate method when unobservable characteristics influence firms' participation in the scheme and the outcomes, which leads to differences between firms in the treated and control groups. This happens, for example, when firms self-select their participation in the scheme due to reasons that also influence their performance. In these specific cases, matching a PSM approach with DiD allows, at a minimum, the evaluators to control for any unobserved characteristic **that is constant over time** (such as motivation, skills or risk aversion) (World Bank, 2012, 2018).

Regression discontinuity design (RDD). This *quasi-experimental* approach is useful to assess interventions – such as PCGSs – that have a *continuous eligibility index*, with a clearly defined cut-off score or threshold that determines which enterprises are eligible to access the scheme and which are barred from doing so. PCGSs for SMEs usually set a threshold of this type to ensure that only firms that score above (or below) the cut-off score (in terms of total assets, sales, credit scoring, number of employees and other values) will be able to gain access to the scheme. The basic concept behind the RDD method is that firms ranking **just above and just below** the cut-off score will be very similar to each other, and thus can act as treated and control groups for the establishment of the counterfactual (White and Raitzer, 2017; World Bank, 2018).

One of the main benefits associated with the RDD method is that baseline data is not required to estimate impact. Nevertheless, as can be seen from the example of Armenteros *et al*. (2014), analysed in Section 4.1, having access to extensive baseline data is useful in order to perform robustness checks to confirm that the treated and control groups selected do not differ in key baseline characteristics. A second important benefit of RDD is that achieving a solid design with this approach can produce results that are almost comparable, in terms of internal validity, to randomized experiments, which explains why RDD-based IEs rank at level 4 – in terms of robustness – in the framework presented above.

In terms of the challenges associated with this method, there is a risk that firms might **manipulate their eligibility for the program**. This happens when a firm is close to meeting the cut-off requirement to access the guarantee scheme and deliberately acts to fill that gap, thereby generating a selection issue that can contaminate the results of the IE. An example of this is when a PCGS stipulates that only firms with a minimum number of employees can benefit from its support, and a firm deliberately hires one more person to fulfil the requirement for access. To avoid this eventuality, it is suggested that the RDD analysis should use cut-off scores based on variables that are arguably more challenging to manipulate by prospective firms, such as sales or income. Another challenge to mention is that **a large pool of firm-level observables** – around the cut-off threshold – is usually needed for an RDD approach to be a feasible option (World Bank, 2012; Mullins and Toro, 2018).

A variant of the RDD method, called **"fuzzy" RDD**, can be employed in those instances where the PCGS does not enforce the cut-off for participation in a rigid manner, but can allow for firms that fall just short of the threshold to receive a guarantee anyway (upon discretion), or it can deny the guarantee to firms that would in theory be eligible. This happens, for example, when the cut-off rating is an important condition to provide a guarantee, but not enough by itself. In this case, there is a risk that IE estimates through a RDD method will be biased. A "fuzzy" RDD methodology, on the other hand, can be applied **as long as the probability of assignment is different**, even in the absence of a sharp cut-off threshold (World Bank, 2012; ALIDE, 2018).

Instrumental variables (IVs). This is the only technique belonging to the *regression-based approaches* category that is used in literature to carry out IEs of PCGSs, although **its use is in fact fairly uncommon**, given the challenges in finding an adequate instrumental variable (IV), or "instrument", to perform the estimation.

An IV is a variable that helps to identify the causal impact of a program intervention when participation in the program is in part determined by the potential beneficiaries. In other words, the method can be used to assess the impact of a PCGS intervention in which SMEs, based on unobserved information, can decide whether or not to participate in the scheme. An IV (or combination of IVs) can be used, firstly, **to predict firm participation in the scheme**. In a second phase, the predicted participation (which is independent of the outcome variable) is used to estimate the impact of the PCGS. Two main characteristics qualify a good instrumental variable:

1. It has to be a strong predictor of firm participation in the scheme (i.e. it has to have a high correlation with participation); and
2. It may not influence firms' access to credit for reasons other than participation in the scheme, (i.e. it must be uncorrelated with the outcomes evaluated).

Intuitively, an IV can be thought of as something outside of the control of the firm that influences its likelihood of participating in the scheme, but which is not otherwise associated with the firm's own characteristics. It can be argued that finding the IV itself is the most challenging part of the whole methodology, as there is no predetermined procedure to find one apart from using one's intelligence and creativity.

There are two main advantages in using an IV method: 1) it does not require baseline data to estimate impact, unlike other methods such as DiD or PSM; and 2) it controls for unobserved differences between participating and non-participating firms, as it isolates the effect of the PCGS from unobserved information which influences the self-selection of firms (World Bank, 2012; Gertler *et al*., 2016).

A practical example of an application of this method can be found in the research of D'Ignazio and Menon (2012), who carried out an IE of a regional PCGS in Italy using an IV to demonstrate its financial and economic additionality. The IE exploited a source of randomness in the implementation of the PCGS, as the bank which was supposed to implement the scheme

had just been acquired by another bank in the period immediately preceding the start of the scheme's operations. As research has shown, in the Italian banking system, firms that have used a bank historically are more likely to make use of it in the future (i.e. the system shows a high degree of "stickiness"). This is due to the high costs associated with changing banks that a firm can face, as well as the importance of firm reputation in obtaining new credit.

Thus, the study managed to identify a set of firms that were more likely to participate in the scheme (and, thus, receive a loan guarantee) not because of their underlying characteristics, but because they were – "historically" and prior to the start of the PCGS's operations – **already clients of the bank implementing the scheme**. Thus, after having predicted SME participation through a valid IV, the study was then able to assess the impact of the PCGS in terms of a series of intermediate and policy outcomes (see Section 4.3 for a more detailed analysis and results of this specific case).

The IV method is quite effective at controlling for both observable and non-observable differences between firms participating or not participating in the scheme. In the categorization framework presented in the previous section this method ranks at Level 4 in terms of robustness – just short of a fully randomized experiment.

Vegetable growing in the village of Bayzak, Kyrgyzstan.

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Section 3

Specific constraints related to the impact evaluation of agriculture-focused guarantee schemes

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From a methodological perspective, carrying out a robust IE of a PCGS active in the agricultural sector presents a series of unique constraints and challenges that further complicates this kind of endeavor, even beyond the evaluation of a guarantee facility covering other types of sectors. Analyzing and illustrating these specific constraints can be of help in facilitating the work of aspiring evaluators (whether development practitioners, academics, local policymakers or others) who seek to carry out a proper IE of an agriculture-focused guarantee scheme.

- **Low levels of data available in agricultural sectors in developing contexts.** In developing contexts, the lack of a **granular, up-to-date and standardized flow of data** on agricultural enterprises, value chains and markets has historically been a major bottleneck to the engagement of formal financial institutions in the sector. These contexts usually present a scenario of high fragmentation (and small business scale) among the agricultural population, which is often highly dependent on subsistence or semi-commercial farming (i.e. only loosely connected to agricultural value chains). As a result, FIs face considerably higher risks (as well as operational, administrative and transaction costs) when targeting small-scale actors in this sector, which is exactly the reason why an agriculture-focused PCGS might be instituted in the first place.

  For the purpose of an IE, this scenario is bound to **significantly complicate** any attempt to assess in an accurate manner the financial or economic additionality that might be generated by a PCGS supporting this constellation of small agricultural enterprises, while also substantially increasing the costs associated with carrying out an exercise of this kind. The quasi-experimental IE methodologies described in Section 2.1 (such as propensity score matching and difference-in-difference) require rich and comprehensive data on both the recipient and control population of enterprises in order to be carried out – data that is usually extremely hard to come by in the agricultural sectors of developing countries.

  Although a local government could support the data collection and analysis process in several ways (e.g. by making available its network of agricultural extension workers or strengthening its data gathering infrastructure), it is evident that the higher implied costs might make this kind of exercise **simply not feasible** or worthwhile from a cost-benefit perspective, unless substantial donor funding is made available.

- **Considerations of political sensitivity.** Agriculture-focused PCGSs in developing contexts are often highly publicized policy initiatives which receive substantial government backing and are usually targeting a sector that can be quite troubled from an economic standpoint. These schemes are often branded with the personal stamp of a high-level political figure or administration that leverages the support provided by the facility to a constellation of small-scale actors to gain **significant returns in terms of visibility and backing among the population**. As such, efforts to properly demonstrate the actual results of such a scheme in terms of economic and financial additionality might not be welcomed, as they might disprove the narrative of the efficacity of the support provided by the facility, while also pointing to the fact (either implicitly or explicitly) that the funds could have been better spent elsewhere.

- **Lack of appropriate technical capacity.** Carrying out an IE of a PCGS requires **substantial and established expertise**, as well as a very defined niche of technical capacity, which is hard to come by both at local and international level. In the case of agricultural PCGSs, this issue is compounded by the scarcity of technical profiles that have familiarity with the evaluation of such facilities in this specific sector. At public level, in the context of most developing countries, this type of technical capacity would be extremely rare to find, unless it is fostered and trained (with public funds) precisely with the objective of realizing this kind of evaluation.

  Furthermore, as will be illustrated in Section 6, it is an established good practice for IEs of PCGSs to be carried out by an **external evaluation team**, such as from academia, a think tank or a non-profit organization, which begets the question of whether this kind of capacity might be found (at all) in a specific developing country. In case it is not found, the option of contracting international experts is bound to be extremely expensive, especially without some kind of donor funding or other type of outside assistance.

- **Extremely high transaction costs.** In most developing contexts, the agricultural population is composed of a constellation of micro- and small-scale agricultural actors scattered across wide and remote rural areas. This high level of geographical dispersion considerably raises **the operational and administrative costs incurred by formal FIs** that seek to finance these actors, keep track of their client behavior, follow up on their loan repayments, and (possibly) capacitate them as well. The issue is compounded by various factors, including the poor state of the connecting infrastructure in rural areas and the weak rural network of brick-and-mortar branches from the commercial banking sector.

  For the purpose of a carrying out an IE of an agriculture-focused PCGS, this scenario is bound to significantly impact on the costs (as well as the operational hurdles) that the evaluators will have to face in order to gather the data required to realize the assessment – considerably more so than if the IE targeted another type of sector whose businesses are not so predominantly rural. These high transaction costs can prove to be **a core barrier for the realization of such an IE**, as carrying out such an assessment will prove to be economically unfeasible unless substantial donor funding is made available.

- **Heightened challenges in demonstrating economic additionality.** As already illustrated in Section 2.2, although demonstrating the financial additionality of a PCGS through an IE is not an easy exercise, it is simpler than proving the economic additionality of such a facility. Assessing the eventual increment in credit flows to SMEs and/or the improvements in loan terms and conditions can be quite challenging due to the obstacles that can be encountered when trying to establish a proper counterfactual, but it is at least a more straightforward exercise than trying to evaluate the impact that the scheme had (indirectly) on a wide range of performance-related aspects of the SME and the longer-term outcomes of the facility itself.

In the case of PCGSs that primarily target the agricultural sector, evaluating the economic additionality of their impact can prove to be an even harder exercise, when considering, for example: the challenges associated with gathering precise and timely data regarding the performance of a fragmented population of agri-SMEs dispersed over large rural areas; the specific skillset – encompassing, for example, agricultural production cycles and agri-value chain dynamics – that evaluators will require to assess the improvements in performance of such SMEs; and the large amount of external variables and shocks that can influence an agri-SME's performance at any point in time, and which will need to be filtered out in order to arrive to a **robust and undisputable set of conclusions** on the actual degree of economic additionality achieved by the PCGS. All these factors will have to be taken into consideration during the design and implementation phase of the IE, and their satisfactory resolution will be a fundamental enabler of the robustness of the evaluation.

A poultry farm in N'DJamena, Chad.

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Section 4

Analysis of relevant impact evaluations of credit guarantee schemes

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This section illustrates a series of **selected cases of non-experimental IEs** of PCGSs, analysis of which can provide readers with useful insights and lessons learned regarding the specific challenges and barriers that researchers have met in the past in the realization of these types of assessments. Although these IEs do not focus on facilities that cover the agricultural sector specifically, given the lack of such studies in the available literature nowadays, their analysis is nevertheless important for aspiring evaluators to learn important lessons on the methodological choices (and related constraints) that other evaluators before them have had to face. A literature review of more qualitative assessment studies (i.e. not proper IEs) that have specifically sought to gauge the effects of agriculture-focused PCGSs can be found in Section 6.

In order to narrow down and focus the scope of this review, the selection of the specific schemes and cases presented in this section was filtered according to one or more of the defining features presented below:

1. The existing literature made available a series of different impact evaluations (or a mix of IEs and minimal-standard assessments) for the same PCGS, which allowed us to underline the differences in results, constraints, biases and challenges related to the specific IE methodologies adopted. This is a common scenario where, for example, successful public PCGSs that can benefit – over the long term – from extensive administrative data collection at firm level, which is then leveraged to perform a range of different IEs. This applies in the case of Chile's Small Enterprise Guarantee Fund (FOGAPE), discussed in Section 4.1.

2. The analysis of the specific IE allowed us to highlight a number of relevant considerations related to the specific methodology used and the individual steps taken to build a specific evaluation model, with a focus on the caveats and limitations that particular study entailed. For instance, the evaluation of the Colombian National Guarantee Fund (FNG) carried out by Arráiz, Melendez and Stucchi (2014) in Section 4.2 is quite interesting for the specific choices of firm-level variables that were employed to estimate the impact of the Fund, through a combination of DiD and PSM approaches.

3. The specific case is interesting due to the adoption of a less common methodology for an IE of a PCGS, which can underline the specific challenges and implicit advantages related to such a technique. This is the case, for example, of a public guarantee scheme in Italy whose impact was assessed by D'Ignazio and Menon (2012) through an ingenious application of the instrumental variable technique (Section 4.3).

It is important to underline that, given the scope and objectives of this research, this analysis focused mostly **on the methodology used to obtain specific results** (together with associated biases, constraints and caveats), rather than the detailed features of the PCGS under focus, or the very results it achieved.

Box 4 Types of guarantee provided by credit guarantee schemes

As illustrated by a comprehensive FAO (2013a) publication on PCGSs in agriculture, the types of guarantee provided by a PCGS can be broken down into four main categories, although these modalities of provision often share overlaps and variations:

1. **Individual guarantees for loans:** this is the most common type of guarantee provision, which gives partial coverage to an underlying principal loan amount. Both the lender and borrower are clearly identified, with a direct connection existing between the two as the application assessment is carried out on a case-by-case basis. On the one hand, this can result in more careful risk management, a lesser chance of moral hazard and, overall, a higher quality credit portfolio. On the other, it can be substantially more costly for the PCGS to manage it (OECD, 2017). While this option can potentially help creating a loan portfolio of higher quality, it can also end up being more costly to manage for the fund;
2. **Guarantee on an investment facility:** some guarantee facilities employ a variation on the standard provision model for partially guaranteeing a bond issue. This type of guarantee is useful when a developing economy already has a functioning capital market in place, and where there is a need to deploy investment funds in the medium to long term. It ultimately results in a lengthening of assets as placements in the money market, thus helping to deepen and stabilize emerging capital markets (FAO, 2013);
3. **Portfolio guarantees:** in this model, the PCGS provides guarantees for a number of loans belonging to a sector-specific portfolio of an FI, in an effort to foster the development of said sector. Although this model can be very effective when the goal is to increase guarantee and credit volume, there is a trade-off in terms of lower portfolio quality when compared to the individual guarantee model. There are two main reasons for this: 1) as the screening process is bound to be less meticulous, it's likely that default rates are going to be higher; and 2) as the credit portfolio will seek to meet a series of defined lending objectives, risk diversification will tend to be lower (OECD, 2017).
4. **Portable guarantees:** a portable guarantee is provided to a specific and identified borrower who can then compare a range of competing loan terms and offers from different lenders. Thanks to the added advantage of the guarantee coverage, the borrower becomes more attractive to a range of lending institutions and is able to develop further linkages with lending institutions. The main advantage of this kind of guarantee is that it allows the association of the guarantee provision process with specific results for a specific actor. The main disadvantage is that it results in high transaction costs for both the borrower and lender (as the lender is dealing with a new and unknown applicant). It has to be noted, however, that portable guarantees are not very common in development finance or agricultural finance.

Table 2 below provides a recap of the various IEs analyzed in this review, together with their ranking in terms of the robustness of the counterfactual (as per Section 2.3) and the specific PCGS they analyze.

Table 2 **Impact evaluations included in the review (in order of presentation)**

Name of IE	Full title	Target PCGS	Methodology used	Ranking
Armenteros *et al.* (2014)	Rethinking FOGAPE: evaluating Chile's partial credit guarantee scheme	FOGAPE (Chile)	RDD	4
Alvarez, Belmar and Opazo (2015)	Evaluating the impact of credit guarantees in Chilean firms	FOGAPE (Chile)	PSM	3
Cowan, Drexler and Yañez (2015)	The effect of credit guarantees on credit availability and delinquency rates	FOGAPE (Chile)	Linear regression	3
Mullins and Toro (2018)	Credit guarantees and new bank relationships	FOGAPE (Chile)	RDD + IV	4
Arráiz, Melendez and Stucchi (2014)	Partial credit guarantees and firm performance: evidence from the Colombia National Guarantee Fund	FNG (Colombia)	DiD + PSM	3
De Blasio *et al.* (2017)	Public guarantees on loans to SMEs: an RDD evaluation	FdG (Italy)	RDD	4
Zecchini and Ventura (2006)	The impact of public guarantees on credit to SMEs	FdG (Italy)	DiD + PSM	3
D'Ignazio and Menon (2012)	The causal effect of credit guarantees for SMEs: evidence from Italy	Undisclosed (Regional PCGS in Italy)	IV, DiD + PSM	4

Source: The author.

4.1 The Small Enterprise Guarantee Fund in Chile

The *Fondo de Garantia para Pequenas Empresas* (Small Enterprise Guarantee Fund) (FOGAPE) is a credit guarantee scheme created in 1980 by the Chilean government and managed by BancoEstado, a large, state-owned retail bank. The mission of the Fund is to provide credit guarantees to formal FIs to enable credit for both micro enterprises (defined as those with less than USD 100 000 in annual sales) as well as small-scale firms (up to USD 1 million in annual sales) in all sectors of the economy. The average enterprise loan guaranteed by FOGAPE is around USD 7 500. The Fund has been recapitalized twice by the government, in 2007 and 2009, with USD 10 million and USD 130 million respectively, although nowadays, as pointed out by De la Torre , Gozzi and Schmukler (2017), it has managed to achieve financial sustainability by covering all its costs through fee and interest income.

The good results achieved by the Fund in terms of **outreach and sustainability** have been attributed to several factors, including: a strong regulatory and supervisory system; a transparent and fair procedure to distribute guarantees and set coverage ratios, based on **an auction mechanism**; and very effective communication and awareness raising on the program's benefits, carried out by the Chilean government (for example through promotional campaigns, as well as providing training to participating FIs).

With regard to **additionality**, the extensive amount of panel data made available by the government both at firm and aggregate level has led, over the years, to the realization of a variety of retrospective impact evaluations by different researchers, whose analysis is quite interesting in terms of the different methodologies employed to estimate the impact of FOGAPE on a range of medium- and long-term outcomes. As will be seen below, multiple evaluations have shown that FOGAPE has had generally positive effects in terms of increased firm access to quality loans, although **results are considerably more ambiguous** when considering economic additionality.

Armenteros *et al.* (2014) sought to assess the impact of FOGAPE on a number of firm-level performance indicators, such as sales, profit margin and debt-to-equity ratio. To carry out their analysis, they employed firm-level data from a two-wave longitudinal survey undertaken by the Ministry of Economy which covered a panel of 2 650 SMEs in the 2007–2009 period, with more than 500 firm-specific variables made available. They used a regression discontinuity design (RDD) approach that exploited the arbitrary cut-off score set by FOGAPE by which only SMEs with annual reported sales of less than USD 1 million were eligible to access the scheme. To keep in line with past evaluations using RDD, the evaluators limited their sample to only those firms whose declared sales fell within a set range on either side of the cut-off score for eligibility. They then carried out robustness checks that confirmed that, on either side of the cut-off, the treatment and control groups did not systematically differ in essential baseline characteristics.

The following outcome variables were then selected the focus of the evaluation: the log difference of total SME sales between 2009 and 2007; the firm debt-to-equity ratio in 2009; the profit margin in 2009; and the long-term debt over total debt in 2009.

Overall, the evaluators **did not find any statistically significant result**, which appears to imply that firm participation in the scheme did not affect the aforementioned performance indicators – either positively or negatively. Sales growth was lower for the treated group than the control group for the 2007–2009 period, which is puzzling considering that increased access to credit should have led to greater investment in working capital and productive assets, and hence increased sales. Equally surprising, the debt-to-equity ratio was lower for treated firms than control firms, as well as the long-term to total debt.

The evaluators suggested three possible hypotheses to explain the absence of impact on the part of FOGAPE in the 2007–2009 period: 1) **an overestimation of the real credit constraint** faced by SMEs; 2) an underlying substitution effect by which banks swap private guarantees with the public ones provided by FOGAPE; or 3) a widespread lack of firm-level expertise and education required to undertake successful investments. To support the last hypothesis, the authors cited a 2010 World Bank Enterprise Survey according to which an *"inadequately educated workforce"* was the second greatest reported constraint to SME productivity. Regardless of the answer, the lack of straightforward results in terms of economic additionality is in line with the outcomes of other IEs that targeted FOGAPE, as will be seen next.

A number of relevant limitations have to be underlined for this study:

1. The relatively short time period (2007–2009) of the collected data does not allow assessment of the longer-term impact that guarantee-enabled investments on technology or other fixed assets might have on firm-level outcomes (such as sales or profit margin);
2. Employing an RDD approach implies assessing the impact of the Fund only on eligible and non-eligible firms lying within a bandwidth around the cut-off threshold. Hence, the study does not provide insights regarding the impact of FOGAPE on very highly performing SMEs (i.e. those above the upper edge of the bandwidth);
3. The time series of the dataset used coincides with the financial crisis of 2007/2008. On one hand, the crisis-induced contraction effect on the Chilean economy as a whole might have contributed to a reduction in the differences between treated and control groups in the outcome variables (such as sales and profit margin). On the other, the overall credit crunch would have been felt less by firms that could benefit from FOGAPE guarantees, which implies that the Fund most likely generated more financial additionality compared with a non-crisis period. Given that public PCGSs are often used as a countercyclical policy tool, this second implication will be of less importance for policymakers.

Alvarez, Belmar and Opazo (2015) carried out an IE to assess whether FOGAPE had in fact contributed towards strengthening firm-level investment, and, secondly, whether the increased firm performance derived from the additional investment had led to an increase in variables such as sales and employment. To answer these questions, they used a combination of PSM (using a Probit model) and DiD on a sample pool of firms provided by the same two-wave survey employed by Armenteros *et al*. (2014) for the 2007–2009 period. The evaluators included a set of covariates in the PSM model that could potentially affect the probability of accessing the guarantees, although only a few proved to be significantly associated with an increased use of the Fund: knowledge of productive development programs; age of the firm; and size. Other variables considered (such as productivity, manager education and total collateral value) did not seem to influence a firm's probability of receiving a credit guarantee provided by FOGAPE.

The study results demonstrated that FOGAPE's guarantees had led to higher bank lending for SMEs in the treated group, as well as increased banking debt compared to the control group. In terms of real firm outcomes, though, the study **did not show any statistically significant effect** of increased credit access on investment, sales or employment growth, which casts doubts on the effectiveness of the Fund. The only statistically significant result found was a change in the **funding source for working capital**, with increased banking credit taking the place of internal funding.

A number of limitations outlined in Armenteros *et al*. (2014) apply to this study as well. The short time span of the data analysed (2007–2009) does not allow to assess the longer-term impact of the Fund on firms' performance-related outcomes such as investment, sales and

employment. Furthermore, the time series coincides with the global financial crisis, which – as noted before – can have different effects on the assessed results.

Cowan, Drexler and Yañez (2015) set out to answer two main questions related to FOGAPE's impact: 1) whether the Fund does actually generate financial additionality among beneficiary firms; and 2) whether FOGAPE affects the incentives and behaviours of banks (i.e. reduction in credit screening and monitoring) and firms (i.e. reduction in repayment effort), assessing this through eventual changes in firm-level default rates. They restricted their analysis to FOGAPE guarantees that backed only long-term investment loans beneath USD 200 000, provided by five banks in the 2003–2006 period.

The authors argued that: "*although the amount of guarantees requested by a given bank in FOGAPE's auction is likely to depend on the amount that the bank is planning to lend, the actual amount allocated to the bank also depends on the bids of other banks as well as on other factors"*. They considered the difference between requested and allocated guarantees to be "unexpected," allowing them to identify the effects of receiving additional credit guarantees on bank lending. They found that banks that receive higher unexpected guarantee allocations make more loans to both new and existing borrowers.

The study found that FOGAPE had a positive impact on credit availability for beneficiary firms, with an additional USD 1 in guarantees generating USD 0.8 in loans for SMEs which were new clients of a bank, and USD 0.7 for established clients. In terms of default rates, the study found that 1) FOGAPE beneficiaries were not more likely to default on their guaranteed FOGAPE loans than their non-FOGAPE loans; but 2) FOGAPE beneficiaries were, in general, **more likely to default than firms in the control group**, as adverse selection led banks to assign FOGAPE guarantees to riskier borrowers. Nevertheless, as will be seen in the research by Mullins and Toro (2018) discussed below, this evidence has been disputed.

Mullins and Toro (2018) attempted to demonstrate FOGAPE's financial additionality in the 2011–2012 period by employing a "fuzzy" RDD approach, obtaining substantially more significant results with the RDD method than Armenteros *et al*. Just like this last study, the cut-off threshold they selected was the annuals sales limit of CLP 675 million[11] (around USD 1 million) for firms seeking to access the Fund. According to the evaluators, a sales-based threshold is sufficiently opaque and hard to manipulate for firms in the sample, thus minimizing bias. To check that the treated and control groups obtained this way were in fact equivalent, the evaluators analysed the density functions on both sides of the cut-off scores, and also compared the monthly sales trends in the two groups.

The authors opted to use a "fuzzy" RDD approach for two main reasons: firstly, not all eligible firms received a FOGAPE guarantee, given that banks do not have unlimited funds and must be selective on which enterprises to assign the guarantee to. Similarly, a considerable share

[11] CLP = Chilean Peso.

of firms both above and below the threshold did not have demand for credit on any given month, which materially reduced the frequency of the treatment (i.e. the guarantee assignment). Secondly, a number of firms whose level of sales was too high to be eligible to participate in the program **ended up receiving a guarantee anyway**, which – according to the authors' inquiries with FOGAPE managers – appeared to stem from a measurement error.

Similarly to other studies on FOGAPE, this evaluation found evidence of positive impact of the Fund in terms of financial additionality. Firms in the treated group **almost doubled their banking debt** in the year they received the guarantee, with a gradual increase throughout the year. Another positive outcome was that the debt increase at the bank channeling the FOGAPE guarantee did not reduce the firm's overall debt capacity, since debt among other banks also increased steadily during that year. The evaluators suggested that this increase in banking debt was due to the **guarantee "liberating" their collateral** to be used to back other loans. Hence, FOGAPE was shown to foster new banking relationships among firms, as well as to expand existing ones.

Unlike Cowan, Drexler and Yañez (2015), the study found **no evidence of increased risk of default** for firms in the treated group, not even when adjusting the model to include only firms receiving a new loan in the same month (on both sides of the threshold). The study did find, however, statistically significant (but economically unimportant) proof that firms in the treated group were more likely to default on the bank providing them with the guarantee, rather than with another bank.[12] The authors argue that this divergence from the results found by Cowan, Drexler and Yañez (2015) stems from their evaluation having access to more refined SME data, and more importantly to exogenous variation at firm level in a RDD model, which allowed them to examine more dimensions of the Fund's impact on the treated group. This is a good example of how IEs carried out on the same PCGS can **employ new models and more comprehensive data sources** to refine – and in this case challenge – established results.

As correctly pointed out by the literature review and analysis on FOGAPE carried out by De la Torre, Gozzi and Schmukler (2017), demonstrating the Fund's financial additionality and sustainability is not enough to confirm that the public funds employed for FOGAPE have been well allocated, as this would require carrying out a **comprehensive cost-benefit analysis on the Fund** spanning its entire existence. Furthermore, the fact that FOGAPE has achieved sustainability in recent years does not necessarily compensate for the USD 140 million spent to recapitalize it in 2007 and 2009, which could have been used to fund other government programs. It is important to mention this as too often in literature a PCGS is declared as "successful" even though no real cost-benefit analysis has been carried out to estimate the cost of achieving its present state of operations.

[12] The authors underline a limitation of note in these results: the data on firm default they employ only extends to October 2013, which is only ten months after the last month of guarantee assignment to firms. Given that default events generally happen after a year from loan provision, the analysis might have partly underestimated actual firm default.

Another important point was raised by Lopez-Acevedo and Tan (2010) in a literature review of past SME development programs carried out in Chile (which included FOGAPE). Their review underlined the importance of instituting a **centralized repository of beneficiary firms' data**, reuniting all M&E data collected by different SME development programs in Chile. In the absence of such a database, it is harder for impact evaluators to select appropriately "unbiased" firms – representative of the overall population – to add to a control group (i.e. firms that have never been targeted by any such development program). Including such firms in a control group can contaminate results and confound estimates when evaluating the impact of a PCGS or other program, unless strong screening and filtering procedures are implemented.

4.2 The National Guarantee Fund in Colombia

The *Fondo Nacional de Garantìas* (National Guarantee Fund) (FNG) was created by the Government of Colombia to strengthen credit access and quality for SMEs, and generate sustained economic growth and employment. Although the Fund was instituted in 1982, the number of beneficiaries and the total value of the guarantees began reaching significant levels only in the 2000s. As of 2013, the FNG was supporting an average of 300 000 SMEs per year, for a total amount of leveraged credit to firms of USD 47 million.

An interesting element to note is that the FNG **does not assess the creditworthiness of its applicants directly**, preferring instead to rely on its lenders (i.e. the banks providing the guarantee) to do so. This has been hailed as a good practice (De la Torre, Gozzi and Schmuckler, 2017), as it allows the PCGS to leverage the already well-established credit assessment infrastructure of the banks, while avoiding a duplication of loan screening efforts between the PCGS and the financial institutions (given that the latter, in any case, would not relinquish the whole credit assessment process to the guarantee facility). In its initial model, the FNG used to carry out the loan screening all by itself, which entailed operating costs of 4.2 percent of the outstanding value of each guarantee. Switching to a system that allowed the direct lenders to perform most of the credit assessment process themselves allowed the Fund to lower its operating costs to less than 2 percent of the guaranteed amount.[13]

[13] As explained by De la Torre, Gozzi and Schmuckler (2017), the downside of this system is that it shifts considerable risk onto the PCGS itself, as banks might not have sufficient incentives to properly screen guarantee applicants. This can be solved by either charging high premiums to banks that show a high default rate in their guarantee-backed loan portfolio, or by lowering the loan coverage ratio of the guarantee – as this shifts more risk onto the lender itself – thereby readjusting its incentives towards properly screening and monitoring the loans covered by the guarantee scheme. The challenge consists in finding a balanced coverage ratio that is low enough to keep the lender incentivized towards assessing loans properly, and high enough for it to still find the guarantee scheme profitable and attractive.

Arráiz, Melendez and Stucchi (2014) carried out a study to assess the impact of the fund in terms of economic additionality in the 1997–2007 period, using a combination of PSM and DiD. The study made use of three datasets, which were merged using firm identifiers, to define a pool of 24 744 firms, of which 3 163 (12 percent) benefitted from the FNG: 1) The Annual Manufacturing Survey, a census of all manufacturing plants with 10 or more employees and output exceeding the equivalent of 500 times the national annual minimum wage; 2) a dataset on foreign trade at firm-level produced by Colombian customs authority; and 3) data provided by the FNG itself. The main constraint with the combined dataset created in this manner was that it restricted the analysis to only enterprises active in the manufacturing sector that had ten or more employees, despite the fact that the FNG also provides guarantees to micro-firms, in virtually all sectors of the economy.

The study began by estimating a participation model using a logistic regression on the data for the 1997–2007 period, with the aim of building a control group of firms that was statistically equivalent to the beneficiaries. The following explanatory variables were included in the model, at firm level: size (defined as number of employees), geographical location, sector of activity, output, capital per worker, salaries, labour productivity, value of fixed assets, and the correlation between cash flow and investment. This last variable was used as an **indicator of the credit constrain**t faced by each SME, since credit constrained firms have to rely significantly on internal funds to finance operations, becoming unable to invest if their cash flow diminishes considerably. Hence, firms with a high correlation between cash flow and investment are more likely to be credit constrained than firms with a low correlation. The estimated probability derived from the participation model (the matching score) was used to match each beneficiary firm with a non-beneficiary firm from the control group that showed the **closest value on the propensity score** (i.e. the "Nearest Neighbour" matching method) (ALIDE, 2018).

To prove that the control group generated in this manner was statistically equivalent to the treated group, the authors carried three robustness checks: 1) a test of mean differences, before and after the matching; 2) a test of difference in the mean value of trends in the variables that are dependent on the additionality model; and 3) a test of equality of the distribution of propensity scores between firms in the treated and control groups (ALIDE, 2018).

In terms of results, the study showed that the FNG did in fact **ease the credit constraint faced by Colombian SMEs**, as firms in the treated group showed a statistically significant lower correlation between cash flow and investment than their counterparts in the control group.

In terms of the economic additionality of the Fund, the study demonstrated a positive impact on firms' output, employment and export, an effect which was maintained for over two years following the delivery of the guarantee. Firms that benefitted from the guarantee grew by an additional 6 percent in terms of output and 3 percent in terms of employment compared with the control group. On the other hand, no positive effect was registered regarding treated firms' salaries, total capital investment or productivity, which suggests that firms used the credit

received through the guarantee to **increase their working capital,** instead of investing in durable goods and increasing their capital stock. As underlined by the authors, this use of credit is consistent with the short-term maturity of the loans guaranteed by the FNG (34 months on average). This last result is similar to what was found by the evaluation carried out by Alvarez, Belmar and Opazo (2015) on FOGAPE, described in the previous sub-section.

4.3 Evaluating the Impact of Credit Guarantees in Italian Firms

Italy is a country with a very well-established network of national, regional and sectoral guarantee schemes (both public, private and of mixed ownership), covering different sectors of the economy. In 2015, the country ranked first in Europe in terms of outstanding volume of guarantees as a percentage of gross domestic product (GDP) (2.1 percent) (EIF, 2017). The extent of this credit guarantee activity, coupled with the large amount of firm-level data made available at administrative level, has led in recent years to the realization of a multitude of studies assessing the impact of a number of selected PCGSs in terms of financial and economic additionality.

De Blasio *et al.* (2017) used a fuzzy RDD approach to estimate the impact of the Italian *Fondo di Garanzia per le Piccole e Medie Imprese* (Guarantee Fund for SMEs) (FdG) in the 2005–2010 period, using as a cut-off threshold the **scoring system**[14] adopted by the Fund itself to define participation. The FdG is a government-sponsored scheme, operative since 2000, that provides guarantees on SME loans with a coverage ratio of up to 80 percent, varying according to the size and regional location of the firm. The scheme fee ranges from 0 percent in least developed areas, to up to 1 percent for loans to medium-sized firms in more developed parts of the country. Between 2009 and 2014 – in the period following the financial crisis – the FdG had backed a total amount of EUR 54 billion[15] of loans to SMEs.

The authors could leverage the Fund's database, which provided a detailed overview of the 70 000 requests for guarantees received by the FdG in the 2005–2010 period. They merged this information with two additional databases: 1) the "CERVED" database, which makes available the financial accounts of a sub-set of Italian firms characterized by the legal structure

[14] The scoring rating of the FdG is based on a number of specific criteria, such as the SME having a solid economic and financial situation, and it not belonging to a number of specific sectors (such as automobile, transport and steel). These criteria are summarized in a multi-stage scoring system that the Fund uses to rank applications according to their guarantee merit. Firms that score over a set threshold are considered eligible but do not necessarily receive the guarantee, as this is dependent on a second stage of assessment.

[15] EUR = Euro.

of limited liability corporations; and 2) the Italian Central Bank's Credit Register, which collects firm-level data on a wide number of financial variables, including loans, interest rates, and default rates.

The study showed that there were significant results in terms of the financial additionality of the FdG, proving that the Fund was quite effective in fostering the amount of bank loans to SMEs. In terms of the impact on the interest rates charged by banks, though, only firms in the upper edge of the threshold (i.e. the better performing ones) appeared to benefit from a substantial reduction. This appears to indicate that the Fund was an effective pilot in counteracting the major credit crunch caused by the global financial crisis. Firms concentrated around the threshold also **showed a higher probability of default**, which tended to diminish at both extremes of the cut-off, implying that the effect of non-performing loans induced by the scheme did not influence either highly performing or badly performing SMEs.

In terms of economic additionality, it was shown that the FdG had **no impact on the levels of investment and sales** for firms in the treated group, as it was shown that the additional credit received through the guarantee was mainly used by firms to finance working capital - such as inventories and trade credit. In terms of recommendations to policymakers, the authors suggested that the threshold for guarantee eligibility could be relaxed if fostering bank loans for SMEs was viewed as the main policy objective, although that had to be balanced with the demonstrated effect of the scheme on increased default probability among firms.

Zecchini and Ventura (2006) used another technique to assess the financial and economic additionality of the FdG – a combination of DiD and PSM – from 2000 (the year the Fund began its operations) to 2005. The study sought to estimate the impact of the Fund on the total amount of credit offered to firms, as well as the cost of borrowing (measured as the nominal interest rate). Their sample included 11 261 firms, of which 1 243 (11 percent) had made use of the guarantee, 3 952 (35 percent) were eligible for it (but did not receive it) and 6 066 (54 percent) were not eligible. Through a DiD approach, the authors compared firm-level outcomes for SMEs in the treated group with those in the control group, both before and after the start of the FdG's operations. Specifically, they analysed whether the cost of borrowing and the levels of banking debt differed substantially between beneficiary and control firms. The PSM method was employed to ensure that no significant differences existed between the two firm groups, validating the control group as a robust counterfactual.

The study showed some results in terms of the financial additionality of the FdG, with the cost of credit for the beneficiary firms being reduced by 16 to 20 percent in the six years of the Fund's operation. Moreover, the median value of bank debt for treated firms was 12 percent higher than for those in the control group. An increase in the amount of total credit obtained by the firms was also registered, although it did not hold statistical significance.

In terms of economic additionality, **no significant difference was found** between beneficiaries and non-beneficiaries. The authors observed that the FdG guarantee capacity in the 2000–2006

period amounted to EUR 233.5 million. By applying a gearing ratio over its capital base, it was shown that the Fund had guaranteed loans amounting to EUR 4.6 billion throughout its six years of operation, which amounted to only 3 percent of the total credit to SMEs in the sectors covered by the Fund. Based on the fact that these numbers were relatively modest, the authors argued that the FdG did not generate a significant macro-level impact -in terms of economic additionality- during the period under analysis.

An interesting finding of the study, though, was that the FdG, unlike other public PCGSs around the world, **had applied a high degree of selectivity** when choosing eligible SME groups, the individual beneficiaries and the coverage ratio. In its first six years of existence, the Fund had shown a cautious lending approach which focused on supporting already established industries and services, rather than backing SMEs to enable investments in new technologies and sectors. According to the authors, this explained why the facility had managed to ensure its financial sustainability, while keeping the loan default ratio at a considerably lower level than the average registered the Italian banking system (1.83 percent against an average of 5.89 percent).

D'Ignazio and Menon (2012) carried out an impact evaluation, published by the Italian Central Bank, which aimed to assess the financial additionality of an (undisclosed) regional PCGS in the 2005–2010 period. The scheme sought to foster access to credit for SMEs that had a total turnover between EUR 1 million and 43 million, although the lower bound was only EUR 500 000 for firms engaged in "priority" sectors (such as agriculture, transport and motor vehicles). The scheme, which covered up to 80 percent of bank losses in case of firm default, had a capitalization of around EUR 20 million per year.

The study used a panel of 9 000 firms. While some of these firms were located in the region where the guarantee scheme was operating, others were selected from three neighboring regions in which the scheme was not active, in order to further populate the control group. This panel was constructed in a similar way to De Blasio *et al*. (2017), by merging the firm-level data from the regional fund with data provided by the Central Credit Register and the CERVED. This allowed the evaluators to leverage an **extremely detailed, combined dataset**, which provided them with extensive information at firm level (e.g. bank debt, details on guaranteed loans, balance sheets, probability of default, various performance-level outcomes).

As already illustrated in the analysis of the instrumental variables method in Section 2.4, the study exploited an exogenous event influencing the bank tasked with implementing the scheme, together with a peculiar characteristic of the credit market in Italy, to employ an IV approach to estimate impact. The regional bank charged with implementing the guarantee scheme had been acquired from another bank (a leading European banking group) just months before the start of the guarantee operations. Furthermore, as shown by research, the Italian banking system shows a high degree of "stickiness": Italian firms rarely change banks, mainly due to the high costs associated with switching and the importance of firm reputation in obtaining new loans.

The interaction of these two elements acted as a strong IV, as it allowed the identification of a set of firms that were more likely to participate in the scheme (and, thus, receive a loan guarantee) not because of their underlying characteristics, but because they were – "historically" and prior to the start of the PCGS's operations – already clients of the bank implementing the scheme. Thus, after having predicted firm participation through a valid IV, the study was then able to assess the impact of the PCGS in relation to a series of intermediate and policy outcomes.

The results of the study show that the scheme had slightly reduced (by 0.5 percent) the cost of accessing banking credit for SMEs. Furthermore, although no significant impact was found on the level of banking debt for treated firms, it was demonstrated that the Fund had encouraged a shift towards **long-term debt** in the composition of the overall SME debt portfolio (a 30 percent increase over three years). This is an important result when considering that Italian SMEs normally show an unbalanced debt structure that is more inclined towards the short-term component compared with the European average. Furthermore, the study demonstrated that there was a slightly higher risk of moral hazard for beneficiary firms, as these showed a larger probability of default than control firms in the first two years following the provision of the guarantee.

In terms of economic additionality, no substantial impact was found on firm-level trade debts or investment. The authors, however, noted that the time horizon considered (three years) might not have been long enough to properly capture the impact of the Fund on firm-level outcomes. Furthermore, they underlined that the period of IE analysis coincided in part with the global financial crisis, which resulted in an overall contraction of investment and turnover in the Italian SME sector, most likely reducing differences between treated and control firms.

These results were tested by the authors through a panel analysis that used a combination of DiD and PSM. The authors analysed the companies that benefited from the guarantee in 2008. In their analysis, they used 95 companies that received the guarantee and 285 companies that acted as a control group. The identification of the control group followed a matching of the nearest neighbour (as in Arráiz, Melendez and Stucchi, 2014) according to variables such as location, sector, short- and long-term financing received before treatment, and the evolution of both before treatment. The results confirmed that the guarantee increased the long-term debt by 29.1 percent and reduced the interest rate by 24 basis points.

Section 5

Literature review of existing assessments of agricultural credit guarantee schemes

Cereals and seeds market in Meru, Kenya.

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As noted throughout this study, no proper IEs of agriculture-focused PCGSs can be found in the current academic literature. Nevertheless, it is possible to find **a number of examples** of studies based on either statistical/econometric modelling or a mixed-methods approach (quantitative and qualitative) which – while lacking the methodology and robustness of a proper IE[16] – provide useful insights into the efforts carried out so far in assessing the effects of such schemes, while also illustrating which hard results are still missing when it comes to unquestioningly proving the financial and, in particular, the economic additionality of such facilities.

This section seeks to provide a brief description of each agriculture-focused PCGS established in a developing context, together with a review of the studies carried out so far, to assess its results.

5.1 The Agricultural Credit Guarantee Scheme Fund in Nigeria

The Agricultural Credit Scheme Guarantee Facility (ACGSF) was launched in 1977 by the Nigerian Government to provide guaranteed credit lines to farmers and foster their access to credit, and is nowadays the flagship financial facility of the Central Bank of Nigeria. It has a prescribed fund of NGN 50 billion[17] (USD 153.8 million), and covers food and cash crops, livestock and fisheries. The Central Bank manages the ACGSF and oversees the daily operations of the facility. Loans disbursed to the agricultural sector by commercial banks are provided by the ACGSF with a guarantee coverage for a maximum of 75 percent of the outstanding loan balance in default.

In the past decade, the perceived poor and shifting performance of the scheme has given rise to a number of studies which have sought to assess its impact on the Nigerian agricultural sector, as well as its main sub-sectors (crops, livestock and fisheries), with the goal of deriving a number of policy implications and (possibly) providing a number of recommendations to improve the scheme's functioning and results:

- **Oparinde, Amos and Adeseluka (2017),** in their study *"Influence of the Agricultural Credit Scheme on the fishery sector in Nigeria"* sought to assess the impact of the ACGSF's number and volume of loans on the fisheries sub-sector, as well as its contribution to the overall agricultural GDP, using a time-series dataset provided by the Central Bank for the 1981–2012 period. To do that, they computed the compound growth of the GDP of the fisheries sub-

[16] According to the categorization of evaluations provided in Section 2.3, these studies would rank at Level 1 or 2 on the robustness scale.

[17] NGN = Nigerian Naira.

sector, as well as its contribution to the overall agricultural GDP, and then sought to assess the influence of ACGSF's number and volume of loans to the sub-sector through the Auto-regressive Distributed Lag (ARDL) model. They estimated that the number of AGSF loans to the fisheries sub-sector had a positive influence on the agricultural GDP, while the volume of ACGSF-covered loans had, instead, a negative effect on the same.

- **Orok and Ayim (2017),** in their study *"The Impact of the Agricultural Credit Guarantee Scheme Fund on agricultural sector development in Nigeria"*, sought to assess the relationship between the ACGSF's operations and the contribution to the national agricultural GDP made by three sub-sectors: crops, fisheries and livestock, using a multiple linear regression of ordinary least square (OLS) model. Similar to the previous study, to carry out their analysis they employed secondary data on the ACGSF sourced from the Central Bank of Nigeria, in this case for the 1981–2016 period. According to their results, there was a significant positive relation between the ACGSF's operations and the sustained rise in the agricultural GDP in the period under analysis, with the scheme having more benefit for the crop sub-sector compared with livestock and fishery.

- **Ojo and Oluwaseun (2015),** in their study *"Agricultural financing and economic development in Nigeria: A study of the Agricultural Credit Guarantee Scheme Fund"*, carried out a statistical analysis of the level of awareness of target farmers on its lending activities and the perceived impact of the Fund on local economic development, through a survey distributed to members of various farmer associations. It revealed that the majority of interviewed farmers (71 percent) were ignorant of the ACGSF's activities, while those who were familiar with it agreed that it had a positive economic impact on the development of their farmer community.

- **Onwumere, Ibe and Ihegboro (2012),** in their study *"Has the Agricultural Credit Guarantee Scheme Fund any impact on agricultural productivity in Nigeria? A look at empirical evidence"* employed a two-variable regression model to evaluate the Fund's impact on the output of three sub-sectors (crops, livestock and fisheries), as well as on overall agricultural productivity, using data from the Central Bank of Nigeria for the 1978–2008 period. Their results pointed to a positive significant impact of the Fund on the output of all three agricultural sub-sectors under analysis.

- **Okon and Nkang (2010),** in their study *"An assessment of Nigeria's agricultural credit guarantee scheme fund: evidence from time-series analysis"*, carried out a macro-econometric analysis in which they modelled the volume by number and the value of guaranteed and repaid loans, with the addition of a credit-determining policy instrument, using the vector autoregression (VAR) methodology (which is used to forecast systems of interrelated time series and to analyze the dynamic impact of random disturbances on the system of variables). The value of the guaranteed loans was identified as being positively related to the number of guaranteed loans and the number and value of repaid loans, but inversely related to the policy instrument.

- **Adetiloye (2012),** in the study "*Agricultural financing in Nigeria: An assessment of the Agricultural Credit Guarantee Scheme Fund for food security in Nigeria"*, used the paired t-test methodology and the Granger Causality test to analyse whether the guarantees provided by the ACGSF were effective, over the period 1978–2006, in fostering agricultural output through two sub-sectors: cash crops and livestock. The author's conclusion was that the Fund was effective in fostering livestock output, but its contribution to the cash crops sub-sector was insignificant.

5.2 USAID's Development Credit Authority

The Development Credit Authority (DCA), created in 1999, is an agency of the U.S. Agency for International Development (USAID) which provides partial credit guarantees (up to 50 percent) for private financial institutions to mobilize local financing in developing countries, as a support to USAID's programs in the field. The primary objective of these guarantees is to **influence the behavior of key formal credit providers** in favor of market segments (such as agriculture) that are traditionally underserved by the formal financial sector. From 1999 to 2015, DCA implemented 40 guarantee schemes and mobilized USD 4.2 billion with 343 financial partners in 74 countries. The average default rate for these programs was 2.4 percent. In 2015, USD 393 million was invested in the agricultural sector, representing 54 percent of DCA's portfolio.[18]

Over the years, DCA has carried out and made available several assessments of the outputs and outcomes generated by its guarantee provision at country level, a number of which have specifically targeted the agricultural sector. DCA's evaluation methodology usually adopts a **mixed methods approach** (quantitative and qualitative), using indicators that track impacts on borrowers, including indicators on gender and first-time borrowers. The impact of DCA's guarantees is assessed on three levels: **financial additionality** (indicators for guaranteed loans in comparison to a financial institution's portfolio); **behavioral change** (specifically a financial institution's behavior toward borrowers without guarantees); **and market demonstration** (the extent to which other institutions have been spurred to increase lending).

- **HONDURAS.** In 2009, DCA published the results of an external evaluation of the guarantee program it had provided in the 2003–2009 period through the **José Maria Covelo Foundation (FJMC)** in Honduras. The FJMC is a private development organization formed in 1991, which began to offer direct credit to micro- and small-scale entrepreneurs as a

[18] As of 2019, DCA has been merged with the Overseas Private Investment Corporation (OPIC) to create the U.S. International Development Finance Corporation (DFC).

microfinance institution (MFI) in 1995, primarily in urban areas. In 2008 the Foundation established the Banco Popular Covelo (Bancovelo), a licensed commercial bank, and sold it most of its loan portfolio.

The DCA guarantees were meant to foster the creation of the FJMC's agricultural portfolio, as the institution had little prior involvement in the sector and saw it as a profitable and strategic market for expansion of its microcredit operations. The guaranteed credit was meant for **micro- and small-sized entrepreneurs with little available collateral**, engaged in any of four sectors: 1) specialty coffee; 2) non-traditional agriculture; 3) forest farming; and (4) light manufacturing (USAID, 2009).

The evaluation team used a mixed methods approach to answer the evaluation questions, including a review of background documents, semi-structured interviews with the Foundation's officials and other stakeholders in Honduras, and an email-based survey directed at the members of "REDMICROH" (Honduras' MFI network). The team developed an evaluation framework with indicators and interview questions to guide the assessment process.

The results of the evaluation were mixed. The FJMC used the DCA guarantee to provide investment capital loans that were overall larger, longer in duration, and carried lower investment rates compared with non-guaranteed loans. Although it initially used the facility to back up all of its loans to small agricultural actors, on DCA's recommendation it started using the guarantee support in a more strategic manner. The guarantee facility did help the FJMC in jumpstarting its agricultural lending operations, although, as the FJMC had set ceilings to its agricultural credit portfolio, the end of DCA's guarantee support determined a notable decrease in the Foundation's involvement in the sector. Furthermore, the evaluation did not find evidence of any impact had by the DCA guarantee program in the levels of **overall lending to the agricultural sector** (for example, if more MFIs had engaged in the sector following FJMC's example), beyond that achieved on the FJMC itself (USAID, 2009).

- **RWANDA.** In 2001, USAID Rwanda developed several projects to provide technical assistance to the implementation of the **National Coffee Strategy**, a governmental initiative launched to foster the productivity and quality of the coffee value chain in the country and to link it to high-value export markets. As part of this support, a DCA guarantee scheme was provided in 2004 to the Bank of Kigali (BoK), the largest commercial bank in Uganda, with the aim of increasing access to credit for strategic export-oriented agricultural enterprises. Qualified borrowers included investors in coffee washing stations, which are a key component of the chosen strategy to improve coffee quality. The DCA guarantee covered 40 percent of the loss of principal on a maximum of USD 2 million in loans. In the 32 months that the guarantee scheme was in place, the BoK issued over USD 1.7 million in investment and working capital loans to coffee washing station investors, employing 86 percent of the available amount.

An external evaluation of the program was requested by USAID in 2009, to assess the performance of the guarantee scheme. The evaluation team employed structured interviews to gather data information from the BoK, USAID, other commercial banks and borrowers, as well as relevant government ministries and departments. At the broader impact level, the evaluation sought to assess whether the guarantee had influenced the commercial banking sector in increasing their lending to agriculture, and specifically to the coffee value chain. The evaluation focused only on how the guarantee changed the behavior of the Bank of Kigali and other banks. It did not evaluate the BoK's performance in implementing the guarantee, USAID's management of the guarantee or the impact of guaranteed loans on borrowers' livelihoods (USAID, 2013a).

According to the evaluation's results, the guarantee program resulted in a substantial increase of the BoK's lending to coffee washing station investors, providing both working capital and capital investment. Thanks to the close coordination of the guarantee scheme's activities with USAID's technical assistance, the bank managed to grow its credit portfolio to the coffee sector rapidly and efficiently. Nevertheless, it should be noted that the BoK extended very little credit to the coffee sector outside of the frame of the guarantee scheme, limiting itself to only a few loans for working capital. More generally, the program **failed to influence the overall lending behavior of the formal banking sector to agriculture**, in the sense that Rwandan commercial banks remained unwilling to increase their portfolio of credit to this sector without the support of a guarantee scheme or credit line.

- **ETHIOPIA.** Ethiopia is a country characterized by widespread lack of access to finance for small-scale actors in the agricultural sectors, with the majority of agricultural lending being provided by the state-owned Commercial Bank of Ethiopia and the Development Bank of Ethiopia, which provided 99 percent of the banking sector's outstanding agriculture loan value as of 2014. In an effort to foster the flow of private lending to this sector, during the 1999–2014 period DCA loan portfolio guarantees were provided to **the Bank of Abyssinia (BoA)**, an established commercial bank, to support its lending activities to agricultural cooperative unions first, and to the broader agricultural sector more in general (USAID, 2013b).

  At the end of 2009, an external evaluation was commissioned by USAID to assess the effectiveness of the DCA guarantees so far provided to the BoA. The evaluation employed a mixed methods approach, which comprised key informant and group interviews, document reviews, and the statistical analysis of loan data. **Limitations in the available data**, as noted by the evaluator, included (a) a lack of data on the BoA's non-guaranteed lending to agricultural actors; (b) insufficient time and resources to survey statistically significant numbers of guaranteed and non-guaranteed borrowers; and (c) conflicting data from both the Central Bank's and the Bank of Abyssinia's annual reports (USAID, 2013b).

  The results of the evaluation showed that, while DCA guarantees were successful in increasing the share of agricultural credit in the BoA's total portfolio from 0 to 2.3 percent,

they did not encourage the BoA towards substantially scaling up its engagement in agricultural lending. Since the BOA was unwilling to lend to potential borrowers with insufficient or no collateral without the DCA guarantees, those guarantees enabled these borrowers to obtain loans larger than they would otherwise have received, if they could have qualified for any loan at all. Following the end of the DCA support, the BoA continued to lend to the sector, but only to large exporters in the downstream segments of agri-value chains. From the point of view of the potential impact had by the DCA guarantee program on formal lending to agriculture in general, the evaluation concluded that the program did not result in any substantial increase in the rates of agricultural credit from the commercial banking sector.

- **ROOT CAPITAL.** Root Capital is a non-profit social investment fund created in 1999, active in Latin America, Southeast Asia and sub-Saharan Africa. Its main goal is to contribute to improving the lives of rural producers by **linking them to the formal economy**. By investing in the strengthening of micro-, small- or medium-sized enterprises (MSMEs) in the agricultural sector, Root Capital seeks to convert them in positive drivers of change for rural communities. The fund provides financial and agricultural advisory services, as well as short- and long-term credit, to the agri-MSME sector, with a specific focus on women- and youth-led entrepreneurship.

  In 2003, USAID decided to support Root Capital's lending activities towards agricultural producer organizations and cooperatives in Guatemala, Mexico, Nicaragua, Panama and Peru with a 50 percent guarantee, up to a ceiling amount of USD million. In 2005, **USAID decided to further support Root Capital's expansion** with another portfolio guarantee to help the organization expand its credit model to the East African region, with the objective of providing credit to coffee growers' cooperatives in Ethiopia, Kenya, Rwanda, Tanzania and Uganda. The Latin America guarantee helped triple Root Capital's non-guaranteed Latin American portfolio from USD 3.3 million pre-guarantee to USD 10.9 million. The second guarantee contributed to nearly tripling Root Capital's African portfolio to USD 2.9 million (USAID, 2013a).

  An external evaluation of this specific guarantee program, commissioned by USAID in 2010, adopted a mixed methods approach that made use of key informant and group interviews, surveys, and loan data analysis. Limitations in the evaluation process included the fact that the evaluating team **did not visit any of the countries to which Root Capital lends**, thereby limiting opportunities to obtain information from the range of organizations which might have helped develop findings related to the impact of the DCA guarantees, as well as to exogenous factors affecting the guarantee program's performance.

  According to the evaluation's findings, the DCA guarantee program was successful in encouraging the **growth of Root Capital's non-guaranteed credit portfolio in agriculture**, i.e. fostering the organization's lending behavior towards an increased (non-supported)

engagement in the agricultural sector, comparatively more than if the guarantee program had not been implemented. Note that these findings are assumptions borne out of interviews with Root Capital's staff, not the results of a proper impact evaluation. From the perspective of the broader financial sector of the target countries of the program, no evidence was found of further involvement of private financial institutions in the agricultural sector propelled or encouraged by Root Capital's successful (and guarantee-backed) experience.

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Pulse market in Cairo, Egypt.

Section 6

Carrying out systematized impact evaluations of agriculture-focused credit guarantee schemes

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By taking into account the various elements illustrated in the previous sections, both from a theoretical viewpoint as well as in terms of practical cases, it is possible to provide a number of considerations regarding the design and field-level implementation of IEs of agriculture-focused PCGSs. Readers can use these considerations to inform their own opinion on the feasibility and opportunity of developing a systematized approach for carrying out impact evaluations of these types of facilities.

Based on the review carried out in this publication – and considering the current lack of specialized literature on IEs of agricultural PCGSs – the author has one primary recommendation for anyone interested in developing a systematized IE approach for these kinds of facilities (whether development agency, academia, or think tank): to focus their resources and efforts **in carrying out a non-experimental pilot evaluation** of this specific kind of PCGS that is as robust and comprehensive as possible, opting for the use of more systematically replicable methods such as RDD and the DiD + PSM combination. This pilot evaluation could act as a stepping stone towards further refining the evaluation model and developing a more systematized approach towards carrying out these kinds of evaluations.

Section 6.1 below focuses on the realization of non- and quasi-experimental IEs of agriculture-focused PCGSs. It provides a series of conclusions and recommendations regarding the most suitable methodologies to establish and analyse the counterfactual; the established technical requirements; the necessary contextual conditions (e.g. existing infrastructure, favourable political conditions, ample and updated data sources available); and other essential elements.

In terms of the possibility of carrying out a fully experimental, RCT-based evaluation of an agriculture-specific PCGS, it should be noted once again that the variety of challenges constraining the applicability of this method have resulted in **no fully experimental IE of a PCGS** ever being recorded in literature. Given the strict set of conditions that has to be in place to enable the realization of an RCT-based IE of any guarantee scheme, narrowing the focus to agriculture-specific PCGSs only complicates the premise further, given that these are quite scarce in number. Although carrying out such an evaluation is indeed possible in theory – and it should in fact be the method of choice whenever possible – there are significant doubts at this stage **regarding its potential for replication on an extended basis**.

In any case, as a theoretical exercise, this study set out to delineate in **Section 6.2** a set of essential considerations that would have to be kept in mind to guarantee the success of a fully randomized IE of an agriculture-focused PCGS, based on the literature reviewed in Section 4 and the elements illustrated throughout this document.[19]

[19] Interested readers who wish to delve deeper into the technical implications associated with carrying out this kind of evaluation should refer to a publication by the World Bank (2018): "Toolkit for Impact Evaluation of Public Credit Guarantee Schemes for SMEs".

6.1 Carrying out non-experimental impact evaluations of agricultural credit guarantee schemes

As shown in the literature, the use of non-experimental IE techniques to assess the impact of PCGSs is the most common choice for evaluators, especially since the vast majority of evaluations are retrospective in nature and need to rely on already established data sources. The following section provides a number of considerations regarding how it would be possible to develop a systematized IE approach that is based on a non-experimental methodology.

CHOICE OF MOST SUITABLE METHODOLOGY: granted that the choice of the non-experimental method to employ in an IE will depend on a number of relevant contextual elements and other considerations, it is a fact that certain approaches lend themselves better to evaluating PCGSs, given their specific strengths and constraints. Based on all the elements illustrated in the previous sections, this study finds that the following two methodologies lend themselves best to the development of a systematized approach (in order of recommendation):

1. **Regression Discontinuity Design:** RDD is particularly well suited to the evaluation of facilities such as PCGSs, as these usually set a clearly defined threshold for firm participation that can be used to establish treated and control groups that are approximately randomized. The method allows the production of relatively unbiased estimates for firms around the eligibility cut-off, while requiring substantially less data than a DiD + PSM combination. The main constraints associated with this method, such as the risk of firms manipulating their eligibility for the scheme and the need for a large number of observations around the threshold, would not represent a major constraint towards developing a systematized approach for evaluating agricultural PCGSs.

   Another advantage of the method is that the empirical validity of an RDD model can be demonstrated, provided that a large set of observations is available. As illustrated by De Blasio *et al.* (2017): *"if the variation in eligibility near the border of the threshold is approximately randomized, it follows that all the baseline covariates at firm level – which were determined prior to the start of the scheme – should have about the same distribution on the two sides of the border."*

   Evidence of the scheme's **imperfect compliance** with its rules for eligibility (i.e. a number of ineligible firms actually receiving the guarantee, or eligible firms not receiving it) should determine the use on the part of the evaluators of a "fuzzy" RDD approach. This imperfect compliance can also take the form of a scoring system that leaves ample room for subjective decisions on who can participate.[20]

[20] This is the case, for example, of the IE carried out by De Blasio *et al.* (2017) on the FdG in Italy (see Section 4.3).

2. **Difference-in-Difference + Propensity Score Matching:** combining DiD with PSM allows for significant improvement in the faithfulness of the control group to the treated group, by controlling for both observable differences of the two groups (through the PSM) as well as non-observable differences among the two that are constant through time (through the DiD). Although establishing the faithfulness of the control group to the treated group is arguably more challenging with a DiD + PSM approach than with a RDD (as the RDD leverages the PCGS's own rules of guarantee eligibility to define the control group), it does allow the potentially carrying out of an IE **on all firms in a chosen dataset** – unlike an RDD which can only estimate impact on firms around the eligibility threshold.

   A core challenge with this combined method is that it requires substantial and accurate data –both baseline and post-implementation – on a wide range of firm-level variables for both the treated and the control group. Availability of such data might not be a feasible expectation depending on the specific country where the scheme is hosted (World Bank, 2018). The lack of **timeliness** is also a core issue with this method, as results on the PCGS's impact (mainly in terms of economic additionality) can usually be obtained only with **a considerable delay**, as the financial information on the analysed firms will be obtained only after the accounting period has ended. This implies that it will be impossible to present the findings of an IE together with the financial statements (and other annual information) of a PCGS (ALIDE; 2018).

   As will be seen below, this study's recommendation regarding carrying out prospective evaluations (i.e. in tandem with the PCGS's operations) through non-experimental techniques most likely implies that RDD should be the **preferred option** compared to DiD + PSM, if the circumstances allow. A DiD estimator could eventually be used eventually to validate the findings of the RDD analysis, as in D'Ignazio and Menon (2013) in Section 4.3.

Finally, **the instrumental variables method** has proven quite effective in assessing the impact of a PCGS while controlling for unobservable information (see for example the case of Mullins and Toro, 2018, in Section 4.1), especially as it does not require baseline data to be performed. Nevertheless, it is a fact that this technique is not easily replicable – given the very context-specific nature of each individual IV – and therefore it is challenging to implement in a systematized manner.

DATA AVAILABILITY: as underlined multiple times in the literature (OECD, 2017; De la Torre, Gozzi and Schmukler, 2017), as well as in the case studies analysed in this review (e.g. FNG, FOGAPE), usually no single database contains all the data required – both at firm as well as industry/regional level – to carry out a robust IE of a specific PCGS, which begets the need to combine different datasets together to establish the foundation for the assessment. This merging and "matching" of the data usually stands as one of the most time- and resource-consuming aspects of a non-experimental evaluation.

For prospective evaluators that seek to pilot an IE of an agricultural-focused PCGS, it would be paramount to select a target scheme that is hosted within a country capable of providing extensive and long-term data at firm and macro level, especially if economic additionality objectives are expected to be pursued by the pilot IE. Otherwise, the technical and financial investment required to collect large-scale data on firm performance might prove to be too costly for such an endeavor.

As pointed out by ALIDE (2018), a possible solution to optimize data collection in the IE is to design and introduce an electronic questionnaire that can be used to collect information on the financial and business activities of SMEs in the treated and control groups, both before and during the PCGS's operations. This questionnaire should also be integrated with the information gathered by the PCGS itself as part of its standard M&E procedures. The use of digital means such as an electronic questionnaire is, of course, strongly dependent on the context on the ground and the resources available to the evaluators themselves.

TIMING OF THE EVALUATION: although so far IEs of PCGSs have only been carried out retrospectively, it is a fact that carrying out **prospective evaluations** (i.e. in tandem with the PCGS's design and implementation) provides a range of consistent advantages, even when non-experimental methodologies are employed. Some of these advantages include:

- **Enhanced data quality:** regardless of the amount of public data already available, data collection carried out by the evaluators themselves represents a strong enhancing factor for the overall solidity and quality of an IE. Synergizing the IE data collection activities with the minimal standard monitoring carried out by the scheme can generate data that is not only higher in quality, but also more targeted to the IE's objectives and methodology.
- **Greater buy-in from stakeholders:** prospective evaluations allow the start of engagement with a range of fundamental stakeholders (e.g. Ministries, academia, financial institutions) from an early stage, which increases the chances of building an appropriate buy-in from their side. Close stakeholder engagement is fundamental, as it can greatly enhance the quality of the IE design and its implementation. It also allows reduction of the risk of political interference and takeover of the study. Stakeholder engagement can take many forms, including advisory groups, theory of change workshops or involvement of key stakeholders in formal peer review (White and Raitzer 2017).

A challenge that must be noted with prospective IEs is that the implementation and expansion of the PCGS might evolve in unexpected ways, with relevant modifications to the baseline scenario (which might destabilize the selected treated and control groups) and associated changes to the original assessment model needed on the go (including, even, the chosen methodology) (White and Raitzer, 2017).

Another fundamental issue to be considered, related to timing, is **how much time evaluators should wait** before extracting finalized results from the available data. The World Bank (2018) recommends assessing the impact of the PCGS on financial additionality **after one to two years** of continued existence of the scheme, and economic additionality **after two to three years**. On one hand, this would leave enough time to ensure that the scheme does in fact generate an impact, first on credit access and then on firm performance. On the other, it ensures that the **evaluation results are not obtained too late**, allowing time to make adjustments to the PCGS's design and operative procedures before it expands too much. Furthermore, the timing of the IE should take into account the most appropriate moment in which its findings will be needed by the policymakers to make informed decisions on relevant policy changes on the program, such as budget revisions or program expansions.

CHOICE OF EVALUATOR: the OECD (2017) suggests that independent evaluation should be preferred over self-evaluation when trying to assess the impact of a PCGS, in order to minimize potential biases towards self-assessed positive outcomes within the IE process, as well as to reduce political interference. Nevertheless, adopting an **internal evaluation approach** also brings a number of advantages, for example in terms of the better knowledge internal evaluators would have on the PCGS's operations and the broader policy context, as well as the greater support they would receive during the evaluation from the PCGS's staff and directors. If this approach is chosen, setting up a robust governance framework to regulate the internal evaluation process can assist in limiting potential self-evaluation biases (refer to Section 6.2 for more details on this) (World Bank, 2018).

Another important choice in IE design is whether the evaluation should be implemented locally, or if outside supervision and assistance should be sought. This, of course, is dependent on the overall capacity available on the ground, as well as political and financial considerations. If external assistance is sought, another importance choice is whether to rely on a local public agency or a private consultancy to carry out the evaluation. While private consultancies can often be more reliable and timely in their delivery, employing them would come at the expense of building public capacity, which could be part of the mandate of the institution carrying out the IE (such as, for example, a development agency) (World Bank, 2018).

CHOICE OF PARTNERS: partnering with representatives from **local or international academia** can significantly contribute to strengthening the technical solidity and transparency of an IE, especially when opting to employ non-experimental evaluation approaches that normally require a substantial expertise in econometrics and statistics. An issue to be wary of – if this type of collaboration is selected – is that of *researcher capture*, whereby a researcher might be more inclined towards developing a study that translates into an academic publication rather than producing a model and set of results that might be useful to the PCGS's managers and the policymakers (or other relevant stakeholders). Possible ways to mitigate research capture include: close monitoring of the evaluation process; ensuring *ex ante* clarity on the evaluation

questions; technical scrutiny of the IE proposal on the part of another impact evaluation expert; and a final review process of the report produced (White and Raitzer, 2017).

COST: as pointed out by Pearce and Ortega (2014), non-experimental impact evaluations do not necessarily have to be substantially more expensive than the minimal-standard (i.e. before and after) monitoring of a specific PCGS. As already mentioned in Section 2.3, the collection of new data represents the highest cost behind a non-experimental impact evaluation. Hence, if a combination of extensive and up-to-date databases already exists at firm level and can be leveraged for the IE, the cost of the assessment can be kept contained, with the main expenses deriving from the matching and merging process. Furthermore, carrying out a **prospective evaluation** would allow the synergizing of the IE data collection activities with the standard M&E operations of the PCGS itself, which has the potential to substantially reduce costs. If the cost of data collection is reduced through these measures, **data analysis will be left as the largest cost component**, which will prove especially high if the expert tasked with carrying out the study cannot be sourced locally (in the country hosting the PCGS) and has to be contracted internationally.

Box 5 Focus on cost-benefit analyses of credit guarantee schemes

As already discussed in the case of FOGAPE in Section 4.1, estimating the financial and economic additionality of a PCGS does not answer the fundamental question of whether these facilities necessarily represent the best allocation of public or private funds. To answer this question, a **cost-benefit analysis** would be required, to estimate the total expected benefits of the scheme compared with its expected total costs. Ideally, a comprehensive cost-benefit analysis would cover different program alternatives (beyond the PCGS), so that policymakers or other actors could properly assess whether a guarantee scheme does in fact represent the most cost-effective solution to achieve a range of set objectives, or if other measures should be preferred.

In the broader framework of a cost-benefit analysis, the **impact evaluation** would estimate the financial and economic additionality (i.e. the benefits), while a **cost analysis** would aim to thoroughly assess the associated costs of the scheme. From a planning perspective, though, an IE should still collect essential information on the related costs of the PCGS and its sustainability, which can feed eventually into a more comprehensive cost analysis. These considerations should be taken into account when designing a prospective evaluation, given the importance that such an eventual analysis could hold for policymakers overseeing the PCGS or other key stakeholders.

Another element to underline is that, counterintuitively, there is often little correlation between the cost of an impact evaluation and the magnitude of the development program being assessed. Two core considerations are relevant in relation to the cost of an IE:

- **Choice of evaluation objectives:** on one hand, demonstrating the financial additionality of an agricultural PCGS is **considerably less expensive** than proving its impact in terms of economic additionality, whether at firm level (e.g. sales, income, investment) or macro level (e.g. growth and employment in the region). On the other, the institution carrying out the IE might precisely want – as a primary goal – to generate knowledge on the longer-term impact of such facilities on economic welfare. In practice, budget considerations will have to be balanced with the choice of the specific firm- and macro-level variables to be assessed through the IE. Related to this, please refer also to Box 5 for an essential distinction between impact evaluations and cost-benefit analyses.
- **Existing available data:** the presence of extensive baseline data at firm and macro level (whether administrative in nature, private or otherwise) can majorly reduce costs in non-experimental IEs, especially when seeking to demonstrate economic additionality. It can also allow the carrying out of **robustness checks** and other controls on the findings of the study, which contributes to the solidity of the evaluation. In the design phase of an IE, the availability of extensive data can shift the scale for evaluators towards employing a non-experimental approach for the evaluation, given the substantially minor expenses that would be involved compared with an experimental approach.

6.2 Carrying out fully randomized impact evaluations of agricultural credit guarantee schemes

In terms of the realization of fully randomized IEs of agricultural PCGSs, a first element to note is that many of the considerations delineated in the previous section apply to RCT-based approaches as well (for example, in terms of data availability, planning and choice of evaluator). Nevertheless, a number of specific considerations and recommendations have to be made for this specific category of approaches.

CHOICE OF MOST SUITABLE METHODOLOGY: this will depend mainly on the level of firm participation in the scheme at the time of the evaluation.

1. **Standard RCT-based approach:** an RCT approach, as mentioned multiple times in this document, represents the ideal "gold standard" for IEs of guarantee schemes. When correctly designed and implemented, such an IE would be fair, transparent and hard to manipulate, allowing for **maximum control of biases** stemming from both observable and unobservable characteristics among the treated and control groups. It also does not require baseline data collection to be performed, although the latter can be helpful to carry out controls on the balance between treated and control groups of firms. Furthermore, RCTs are easier to analyse than non-experimental models, requiring a more limited knowledge of statistics and econometrics. An RCT model is quite intuitive, and its results are usually more straightforward to communicate and explain to policymakers (World Bank, 2018; White and Raitzer, 2017);

2. **Encouragement design (ED):** ED is a variant RCT-based method which can be useful to evaluate programs **with universal eligibility or voluntary enrolment**, such as PCGSs, which (at the time of evaluation) have a low participation rate.[21] This scenario of under-participation would normally constrain evaluators from using a standard RCT-approach to randomly select firms for the treated and control group, given that the sample pool they can draw from is too small.

   Through an ED approach, a sub-set of agri-SMEs would be randomly selected to receive one or multiple incentives to participate in the guarantee scheme. Examples of "promotions" of this kind can include delivering targeted awareness campaigns on the scheme's benefits, handing out marketing materials or providing **financial incentives to participation**. An example of the latter could be reducing the cost of applying to the guarantee facility for a random sub-set of firms. The evaluators would then separately assess the success achieved by the encouragement itself (i.e. what share of those firms that received an incentive actually entered the scheme), and the actual impact that the PCGS had on the treated group of "encouraged" firms (World Bank, 2018).

   Identifying the specific incentives can be a challenge unto itself, as they have to be proven to **considerably influence the likelihood of firm enrolment in the scheme**. Furthermore, the selected incentive can encourage the participation of a specific sub-set of firms that differ from the general population, due to specific characteristics that make those firms more "vulnerable" to the incentive. This can result in biased differences between the treated and control groups (World Bank, 2018).

DATA AVAILABILITY: a fundamental point to note is the need to collect data not only on beneficiary firms, but also on agri-SMEs which have unsuccessfully applied to the scheme. Furthermore, it would be ideal to collect data not only on the performance-level outcomes (e.g. employment, sales, output) chosen for the analysis, but also on **several other variables at**

[21] In the same way as the standard RCT approach, encouragement design was never used to carry out an experimental IE of a PCGS.

baseline that can capture differences across firms in the treated and control group. This data can help to empirically verify that no observable differences exist among treated and control firms' characteristics, prior to the start of the PCGS and of the IE. Overall, data collection should focus more on microdata (i.e. firm-level or contract-level data) as opposed to aggregated data, as this enables a more rigorous analysis and the results will adapt more naturally to changes in the PCGS's design.

COST: as made clear by the World Bank (2018), the stakes must be high to justify the mobilization of the considerable technical and financial resources required to carry out a high-quality experimental IE. This implies that the specific agricultural PCGS has to be strategically and financially important (for the government, evaluating agency and other partners), and/or reach a quite considerable number of firms. The IE should also add substantial information on the effectiveness of the scheme, on top of the existing evidence base, something which is considerably easier to justify in the current scenario where IEs of agriculture-focused PCGSs are still uncommon.

CHOICE OF EVALUATOR: the same considerations presented in the previous section also apply to a fully-randomized evaluation. In the case of a fully randomized IE, the World Bank (2018) recommends that a PCGS establish an independent evaluation unit, reporting directly to the board of directors, to manage and coordinate the evaluation process. These evaluation units should include a combination of the PCGS's staff, representatives from academia and specialized consultants. The unit would be responsible for developing the evaluation plan and determining the methodology to adopt, the timeline for producing the findings, the budget ceiling, the minimum data requirements, the data collection strategy and all other relevant elements. After developing this foundation, the unit can then decide whether to sub-contract the entire evaluation, or just components of it, to external contractors.

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Farmer driving a tractor in Nyahururu, Kenya.

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This publication has been developed to assist in overcoming the current gap in empirical data on the impact of credit guarantee schemes in the agricultural sector, by providing interested readers with key information on various technical and operational aspects associated to evaluating the impact of these facilities.

The hope is that a range of stakeholders interested in carrying out a proper impact evaluation of an agriculture-focused guarantee scheme (whether policymakers, academics, practitioners from development agencies or others), can use the guidelines and technical considerations provided in this publication as a key reference for their work.

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