

*Improving financial access to rural business. An impact evaluation of Mexico's credit guarantee programs*

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*Abstract*

*A prevalent problem for small rural business is the lack of financial services to support a potential transition from subsistence production into modern commodity production system. Constrained private resources limit rural business development and marketization of the countryside. A common tool that governments use to ease credit rationing to rural businesses are the Credit Guarantee Schemes (CGS).*

*The study analyzes the effects of policy implementation in Mexican CGS and the impact on small rural businesses that do not have access to private financial resources. Whether improved financial access after the implementation of a new program on the credit guarantee system leads to a change in targeted rural businesses.*

*A reduction in the average amount per guaranteed operations is found and it leads to a CGS shift in the targeted beneficiaries. Smaller rural producers are being included in the CGS due to changes in program eligibility conditions. The CGS beneficiary shift is assessed using Interrupted Time Series. Financial support and accessibility increased after the implementation of the Fondo Nacional de Garantías (FONAGA). The study shows temporal and permanent shifts on some of the credit guarantee operation parameters.*

*1. Introduction*

The persistent need in countries with emergent economies is to lessen poverty and promote economic growth in rural areas. Such need has encouraged the creation of public policies and institutions that provide support for financial access. Governments have explored different alternatives as policy options to maximize the public provision of means to create welfare in the countryside. Credit guarantee programs are considered as a feasible option to increase financial accessibility and produce an economic transformation in impoverished areas.

Normally, low-income regions are rural settlements that perform primary activities such as agriculture, forestry, fishery, or stock breeding at the most basic level and only for subsistence. People organize in small groups, mostly family-based, that can be denoted as enterprises in their most basic concept. These productive units are the start point for policies that promote rural economic growth and transition. However, implementation and outcomes of policies in terms of rural development are not as successful as they were thought. Sometimes rural producers cannot meet the programs eligibility conditions keeping them out of the program benefits. Some types of Credit Guarantees Schemes (CGS) enable rural enterprises to access financial resources from private financing institutions. CGS can connect borrowers and lenders that otherwise could not engage in a business relationship. Unlike traditional rural support based on subsidies or cash transfers, in this setup government participation is constrained to a third party in the borrower-lender relationship rather than being an active investor. CGS can be seen as an inexpensive alternative of public policy for rural development. This mechanism for credit accessibility has been replicated in many countries with different purposes and regulations. Beck et al. (2010) investigated the variety of credit guarantee funds across the world. Based on a survey, they found that fund ownership, management, and funding structures vary widely. Gudger (1998) revealed the diversity of CGS based on the CGS experience in Europe, Asia and the non-Asian developing countries and multilateral guarantee programs sponsored by donors and NGOs. Green (2003) identified over 2250 schemes across 100 countries and found that the major types of guarantee systems are mutual guarantee associations, publicly operated national schemes, corporate associations, schemes arising from bilateral or multilateral co-operation, and schemes operated by NGOs.

Despite this variety, each CGS framework uses a mechanism aimed to fill gaps in the credit supply. Green (2003) argues that CG schemes are looking to achieve social goals such as reducing community/societal tensions, empowering marginalized groups or assisting post-conflict reconstruction. This occurs more frequently under public or multilateral cooperation CGS ownership and management than in CGS funds operated by mutual or corporate associations which often have different incentives. Due to the wide application of this kind of programs, the processes of CGS implementation and evaluation have been researched across many economic sectors and social strata. For example, Korea established its Technology Credit Guarantee Fund to support companies with significant growth potential in technology (Sohn et al. 2005). In Malaysia, the Credit Guarantee Corporation provides guarantee cover to Small-Medium Enterprises (SMEs) in the general business, manufacturing and agricultural sectors (Boocock and Shariff 2005). After a period of prolonged stagnation in the 1990s, the Japanese government introduced the Special Credit Guarantee Program for financial stability to alleviate the severe credit crunch faced by the small business sector (Uesugi et al. 2010). The Colombian micro-small and medium enterprises are eligible for the National Guarantee Fund support that applies to all areas of the economy except agriculture (Arraiz et al. 2014). In general, the purpose of a CGS hinges on the different incentives of its participants. Borrowers are seeking capital, lenders are looking for investments according to their risk profile, and guarantors are looking for first-hand information about the borrower and lender to link them in a formal business relationship. Given these basic features, a CGS can vary widely in design, purpose and participants. For instance, borrowers can be organized in productive units with authorized representatives or can be single individuals; the credit guarantee can cover just a percentage of the loan or can grant total loan coverage; the guarantor can manage private or public funds to back guaranteed operations.

## *2. Mexican Credit Guarantee Programs*

While the rural sector have been supported by credit guarantees across many parts of the globe, the Mexican case offers an opportunity to study a public program that is subject to socio-economic conditions that arise from

contrasting commercial relationships with developed economic partners at the north border and emergent economies at the south. This study highlights the need of policy evaluation that reinforces decision-making to improve eligibility conditions on existent CGS and new schemes that target the poorest rural businesses. The Mexican government has established various agencies that assist SMEs in a variety of productive activities. The level of development of CGS programs varies widely, meaning that the context where CGS programs operate plays an important role. The business activity of the SMEs, the structure of the Mexican financial system and the political-economic model adopted by the country are part of such context. In the late 1930s, when the government reached a sustainable path for institutional governance after the Mexican Revolution, one of the primary objectives of the political agenda focused on business development and economic growth. A new banking law was drafted in 1932 that created a National Credit Institution, which later on was transformed into a set of Development Banks (Turrent 2008): The National Bank of Public Works and Services (*Banobras*), The National Financial (*Nafinsa*), The National Bank for Exports (*Bancomext*), The Bank for *Ejid*os and The Agriculture Bank among others. *Banobras*, *Nafinsa* and *Bancomext* are institutions that currently operate. In the 1950's, government's leading concern was to put in practice the import substitution economic model. In that decade several trust funds was created for specific purposes; Special Purpose Vehicles (SPVs) for small and medium enterprises, mining industry, tourism, agriculture, workforce training, and many others. Therefore, some public trusts began to operate as second tier banks, lending to private banks at a preferential interest rate to promote credits to the most needed enterprises. In this way, a second tier bank tries to create a link or business relationship between private banks and the productive sectors as a third party source of funds. It was not but until the 1970's when the first SPV was created to promote CGS for the agricultural sector, specifically with the inception of the *Fondo Especial de Asistencia Técnica y Garantía para Créditos Agropecuarios (FEGA)* in 1972.

### 2.1. *FEGA* and *FONAGA*

*FEGA* offers guarantee schemes to qualified financial intermediaries (FIs), that is, FIs that have established a business relationship (1st tier - 2nd tier credit agreements) with the trust fund manager to provide financial services to the agricultural and agribusiness sector. *FEGA* has specific operating rules for the CGS program. Credits for fixed investment and working capital are covered by partial guarantees comprising no less than 40 percent and no more than 90 percent of the loans that the FIs issue to rural producers. The beneficiaries of *FEGA* have to provide a liquid collateral of at least 30 percent of the loan and a guarantee fee that covers the trust fund operating costs and the risk premium of expected loan defaults.

The Mexican Federal Government created on March 31, 2008 the CGS named *Fondo Nacional de Garantías (FONAGA)*. *FONAGA* is the result of coordination between the Ministry of Agriculture, Livestock, Rural Development, Fisheries and Food (*SAGARPA*), the Ministry of Finance and Public Credit (*SHCP*) and *FEGA* trust fund. It was founded with resources provided by the federal government through *SAGARPA* (1.288 billion MXN) with the main objective of strengthening access to credit for small producers. *FONAGA* was meant to operate independently or in combination with the existent *FEGA*, focusing attention on segments that were not fully served by *FEGA* and commercial banks.

*FONAGA* facilitates producers who do not have sufficient collateral to obtain a loan from financial intermediaries under *FEGA* operation rules. *FONAGA* provides up to 20 percent out of the 30% of the collateral that *FEGA* requires. Unlike *FEGA*, *FONAGA* does not charge any guarantee fee to its beneficiaries. Figures 1 and 2 show the general configuration of both programs<sup>1</sup>.

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<sup>1</sup> *FONAGA* has been modified since its inception. For example, in July 11, 2016, an update of the *FEGA* operation rules made the liquid collateral not compulsory anymore; this is optional according to the risk perceived by the FI.

Credit type	Fixed Investment	Working Capital
Eligibility	Whole country	
Liquid collateral by beneficiaries	30%	
FEGA	40% to 90% nominal coverage and fee charged	

**Figure 1.** FEGA structure without FONAGA

Credit type	Fixed Investment	Working Capital	
Eligibility	Whole country	South-Southeast	Rest of the country
Liquid collateral by beneficiaries	10%		
FONAGA (no fees)	20%	14.29%	8.3%
FEGA (Fee cost)	50% optional	50% or 80% optional	50% optional

**Figure 2.** FONAGA structure with FEGA optional

When FIs and rural producers decide to cover the credit with *FONAGA*, *FEGA* coverage becomes optional. Therefore, in case of credit default, the first resource to claim in the priority order is the 10% liquid collateral provided by the rural SMEs. Afterwards, *FONAGA* resources are used to cover the remainder of the default. When *FONAGA* cannot cover the outstanding balance, the rest of the credit balance due is covered by *FEGA* if it was previously signed.

### 3. Credit Guarantee Schemes for rural development

The analysis that follows assesses whether Mexico's provision of financial support does in fact generate access to private funds and stimulate small rural business development in regions and sectors that traditionally have been self-sustaining at the basic level. Specifically, the assessment is focused on the rural SMEs engaged in primary economic activities, and the CGSs specialized in the agricultural sector. *FEGA* and *FONAGA* are the major public programs with national coverage that assist rural SMEs in Mexico, even though at the local and sectoral level similar initiatives exist depending on the state or productive area where SMEs are operating.

CGS are useful tools of public programs to improve rural development through financial access. Empirical evidence of the links between access to financial services and development outcomes has been rather limited (Demirgüç-Kunt et al. 2008), and little has been done on Mexican CGS. For instance, a model based on comparative statics to determine the break-even increase in the credit supply using Mexican loan guarantee programs has left more questions about efficiency and effectiveness than it has answered (Benavides and Huidobro 2008). A descriptive evaluation of Mexican CGS gave mixed indications of success in private credit supply promotion, enhanced competitiveness, and improved credit terms (Huidobro and Reyes 2014). Institutional research papers by the National Banking and Securities Commission (*CNBV*) have been issued to promote knowledge about the financial system in Mexico. *CNBV*'s closest research related to the present study is one by

Peña and Ríos (2013) that empirically assesses the impact of the *NAFINSA* CGS. They found that guarantees are associated with lower interest rates and higher loan amounts. However, this influence is bounded by the eligibility criteria of the program, aimed at SMEs involved in the secondary manufacturing industry, commerce or services, leaving out most of the rural SMEs. This study therefore is intended to fill the gaps in the existing literature for primary economic activities and the rural sector. Since access to financial services is a significant policy challenge not only for the agricultural sector in Mexico but for many developing and developed countries, it is worth analyzing which government actions are the most effective strategies for promoting rural development.

#### 4. Data

The selected period runs from January 2004 to December 2013 on a daily basis. More than 395 thousand guaranteed credit lines were granted through 89 Financial Intermediaries (FIs) along this period. The database contains information about the credit lines covered by *FEGA* alone, *FONAGA* alone and *FEGA* and *FONAGA* combined. The amounts of guarantees are in constant Mexican pesos (MXN) with an adjusted money value as of 12/31/2010.

CGS cover primary economic activities, more than 139 types of produce were benefited. Such value chains were divided into five broad categories to represent the (1) Agricultural produce, (2) Forestry, Plant-Fruit-Flower growing, (3) Livestock, (4) Fishery and (5) Other Productive Chains. Table 1 shows the categories of economic activity that summarize the number of types of produce and the percentage of guaranteed credit lines issued in the 2004-2013 period.

**Table 1.** Categories for the types of produce and guarantees based on economic activity

Economic Activities	Number of types of produce	Percentage of guaranteed credit lines
Agricultural Produce	56	48.2
Other productive chains	1	17.3
Forestry, Plant-Fruit-Flower growing	62	16.6
Livestock	9	16
Fishery	11	1.8

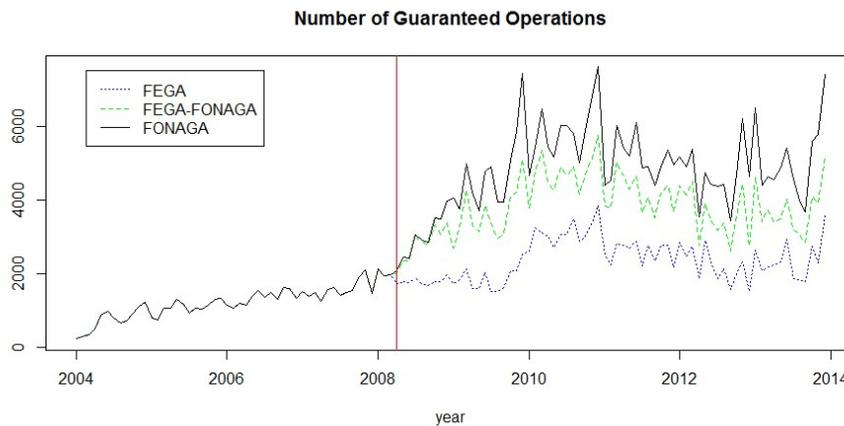
#### 5. Method

##### 5.1. Policy Intervention, Interrupted Time Series

*FONAGA* can be seen as a policy change in the CGS eligibility conditions. *FEGA* continues to operate with the previous conditions, though. Under these circumstances, some kind of intervention analysis is required. There are alternative examples in the literature. Lelarge et al. (2010) evaluated the change of eligibility rules of the French guarantee program (SOFARIS) under a two-step estimation model (Heckman approach). Zecchini and Ventura (2007) applied a difference in difference model to the Italian guarantee system to test *additionality* in the presence of the counterfactual (CGS beneficiaries vs. CGS Non-beneficiaries). In the present analysis, interrupted time series (ITS) is selected as the intervention model to test the impact of *FONAGA* in the current *FEGA* program. Proposed as a quasi-experiment by Campbell and Stanley (1963),

ITS controls for selection bias by making several observations of program beneficiaries before the new program implementation, and taking another set of observations after the new conditions come in. Under time series analysis, it is possible to capture cyclical behaviors, trends, and an expertly observed discontinuity. ITS should also be able to measure the shift and intensity of such intervention.

The regular operations in *FEGA* were affected by new transactions that included *FONAGA* coverage. More than three hundred and ninety five thousand CGS operations were reported within the period under study. From January 2004 to April 2008, the program has *FEGA*-only coverage, and after April 2008, guaranteed credit lines were issued in three forms: *FEGA*-only, *FONAGA-FEGA*, and *FONAGA*-only coverages. The number of credit lines covered by *FEGA* until April 2008 was around 63 thousand, which represent 1,236 guaranteed operations per month. Then, after the introduction of *FONAGA*, the average number of transactions per month that were covered only by *FEGA* raised to 2,350, representing an increment of 90% of issued guaranteed credits. On the other hand, the new guarantee schemes composed by *FONAGA-FEGA* and *FONAGA*-only have averages of 1,465 and 997 guaranteed credits per month respectively. Figure 3 shows the number of guarantees stacked for each type of coverage after 2008. The vertical line showed the time when *FONAGA* started.



**Figure 3.** Time series for number of guarantees by type of coverage

Additional to the number of guaranteed credit lines, the total amount covered by guarantees and the average guaranteed amount per operation are analyzed on a monthly basis. To evaluate the magnitude and dynamic patterns of the *FONAGA* program as the policy intervention in the existing *FEGA*, the ITS model therefore is used with controls for time trends and seasonality that would otherwise hinder the observation of the actual influence. The ITS model considers an external component that represent the policy intervention in the data, assuming that the time at policy intervention is known and whether the response is permanent or temporary. The usual assumptions of Ordinary Least Squares (OLS) do not apply to time series datasets because the error term at time  $T$  is usually correlated with errors at previous points in time ( $T-1$ ,  $T-2$ , ...). The study therefore follows Box and Jenkins (1976) for model specification.

Once the model specifications have been tested and validated for parameters that model autocorrelations, moving averages and stationarity, the ARIMA models are suitable for univariate forecasting taking into account all the modeled trends, seasonal and noise components. The purpose of the pre-intervention modeling is to forecast the series without the influence or effect of *FONAGA*. The forecast process is based on the optimal minimum squared error (MSE) of the one-step forecast in period  $T$  conditioned on previous observations (Eq. 1) when for larger horizons  $h$ , the forecast can be obtained recursively (Eq. 2).

$$y_{T+1|T} = E(y_{T+1}|y_T, y_{T-1}, \dots) \quad (1)$$

$$y_{T+h|T} = E(y_{T+h} | y_{T+h-1}, y_{T+h-2}, \dots) \quad (2)$$

This method relies on the condition of independent error terms  $\varepsilon_t \sim iid \ N(0, \sigma_\varepsilon^2)$  or white noise, which is tested before the forecasting process is performed. The forecast assumes no intervention in the time series since the forecasted future values are based on previously observed values. In other words, the forecasting process acts as a counterfactual in the presence of *FONAGA*. The forecasting strategy brings prediction intervals for each point ahead forecasted.

Each time series comprises the credit lines guaranteed by *FEGA* alone at the pre-intervention stage, and *FEGA* and *FONAGA* combined in the post-intervention period. To estimate the intervention effect, the first step is to model the pre-intervention series to establish the baseline for forecasting. Once the models have been fitted, it is used to forecast points up to the last record of the original series, that is, from May 2008 to December 2013 and to compare the original post-intervention time series with the forecast series.

## 6. Results

### 6.1. The *FONAGA* intervention

Figure 4 shows the time series for three different parameters of CGS operation, the number of guaranteed operations, the total amount secured, and amount per credit guarantee issued on a monthly basis. The amounts covered were converted to constant MXN millions with baseline at 12/31/2010.

As it is shown, the number of guaranteed operations experienced a marked change after the entering of *FONAGA* in April 2008. The number of credit lines backed by a guarantee increased at a higher rate after *FONAGA* started operations. In the case of total money amounts covered by guarantees, the change seems to be subtle or even non-existent. Neither there is a noticeable shift in the series trend nor the intercept, meaning that time series for the CGS balances apparently do not have significant changes after *FONAGA* appeared. Regarding the time series for the average monthly amount per CG operation, a notable decline appears after April 2008. Given that the number of guarantees increased and the money resources showed no increment after *FONAGA*, the guaranteed amounts per operation are less compared to the guarantee services before April 2008.

The shift shows that the kind of SMEs targeted by the program now includes more small-sized rural SMEs that require less amount of resources to run operations.

Other point to note is the higher variation on CGS operations after *FONAGA* started. For instance, a large spike is visible in late 2009 for all three plots. This is due to a continuous influx of fresh federal resources into the Credit Guarantee program after the *FONAGA* start<sup>2</sup>.

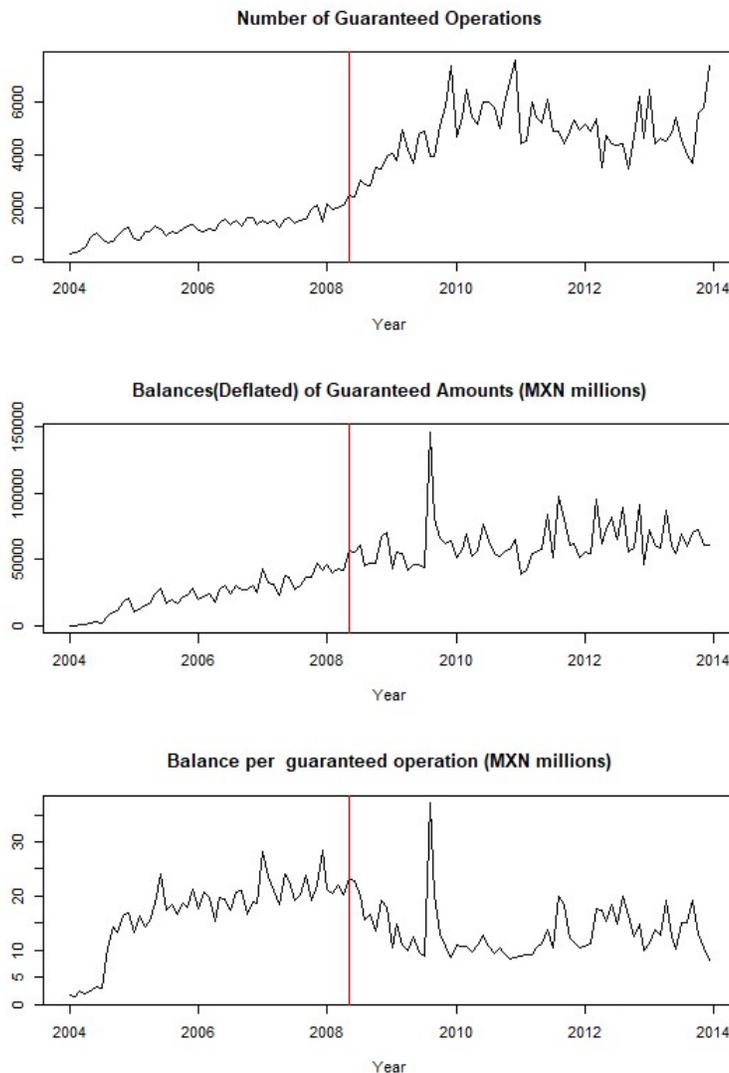
From Figure 4 it can be seen that all time series display some trends and potential seasonal behavior. Most of the economic processes that *FEGA-FONAGA* supports are subject to seasonal demand and production life cycles. Therefore, seasonality that affects the demand for financial support is expected in the time series and taken into account in the model. The Auto Regressive Integrated Moving Average (ARIMA) model captures such kind of behavior. Box and Jenkins (1976) was used to calculate ARIMA model specifications for each time series analyzed. The identification, parameter estimation and model validation were run to select the

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<sup>2</sup> Public budget contributions from SAGARPA to FIRA in the 2008-2012 period were injected to *FONAGA*. The first two years after *FONAGA* began there were substantial contributions to continuing and supporting operations. Additionally, a policy change took place within *FONAGA* operating rules in August 2009. A new fund (PROMAR) was created and included into *FONAGA*'s resources as an amendment to the agreement between SAGARPA and FIRA. Such modifications included new support for the fishing and aquaculture sector, which is probably the reason for the increasing variation of operations and balances in the time series.

best-fit model based on the AIC parameter. Table 2 show the model specifications and the parameter estimation for each series.

All time series model specifications are integrated of order one  $I(1)$  at their both non-seasonal and seasonal component. This general characteristic reflects the presence of non-stationarity behavior through time in all series. Autoregressive and Moving Average parameters have been specified in both seasonal and non-seasonal parts, indicating the presence of correlations through time in the three series.



**Figure 4.** Time series for the total number of guarantees, guaranteed amounts and amounts per guarantee

The forecasting strategy brings prediction intervals for each point ahead forecasted. The number of forecasted points is 69 months (May 2008 - Dec 2013). The next time series plots with the forecasted series (Figures 5, 6 and 7) after May 2008 show three prediction intervals around the forecasted series (50%, 95%, and 99% probability).

**Table 2.** Time series ARIMA parameter estimations

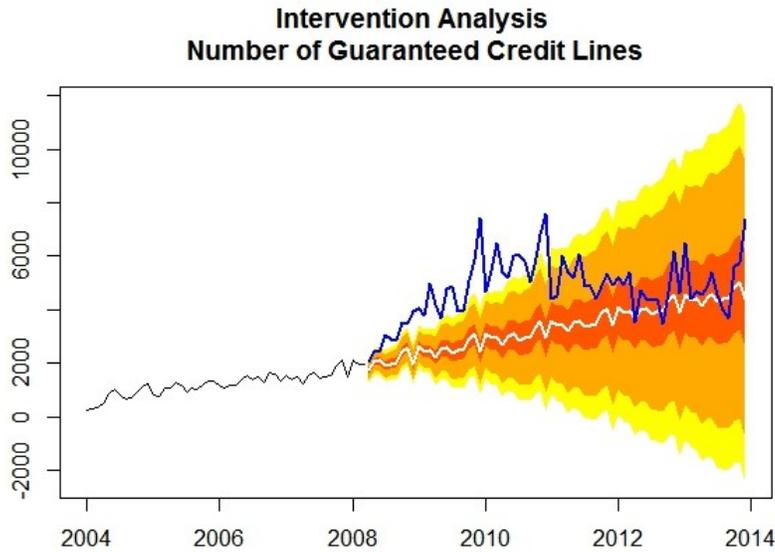
Time Series	Model Estimation	AIC
Number of Credit Guaranteed Lines	$Y_t = \frac{(1 - 0.5153_{(0.1574)}B)}{(1 - B)(1 - B^{12})} \varepsilon_t$	502.51
Covered Amount in MXN	$Y_t = \frac{(1 - 0.7375_{(0.1271)}B)(1 - 0.6242_{(0.3028)}B^{12})}{(1 - B)(1 - B^{12})} \varepsilon_t$	768.87
Amount Covered in MXN per Credit Line	$Y_t = \frac{(1 - 0.5671_{(0.2659)}B)(1 - 0.9998_{(0.4443)}B^{12})}{(1 - 0.1730_{(0.3244)}B)(1 - B)(1 - B^{12})} \varepsilon_t$	218.38

It can be seen that prediction intervals get wider when the predicted points depart from the last observed point of the series. The precision of forecasts gets diluted when the predicted point is moving away from the last observed period. It is reasonable to see that predicted points are bounded in wider confidence intervals, especially due to the non-stationarity condition of the time series.

In all cases, the forecasts follow an upward time trend with some seasonal variations that are smoothly replicated from the original series. The next step is to superimpose the real time series observations after *FONAGA* started operations. With the premise of all other things being equal before and after the intervention, the difference between the forecasting and the real values should tell the impact of the *FONAGA* to the whole credit guarantee program.

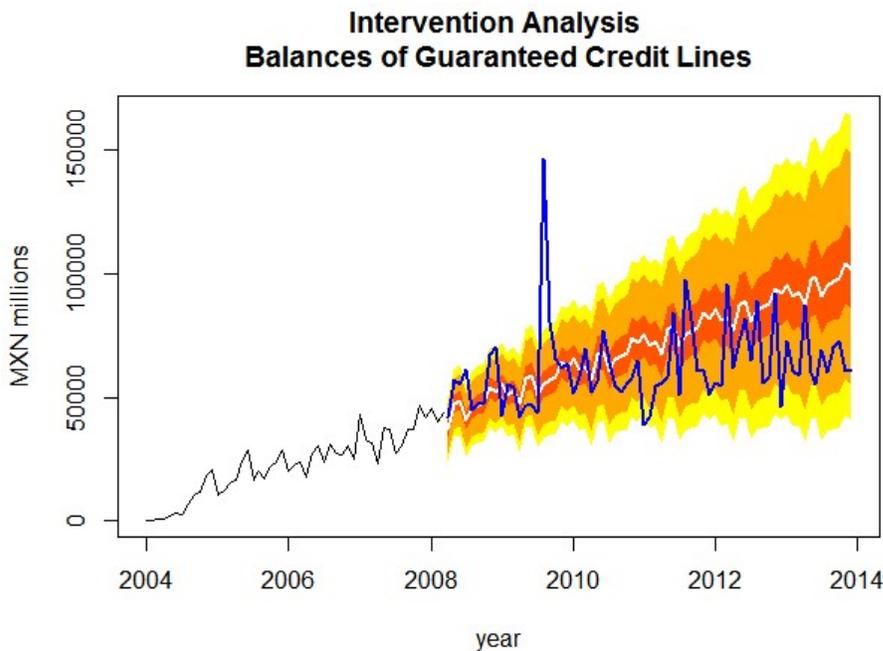
The superimposed real observations over the forecasted series of the total number of guaranteed credit lines shows a significant rise once *FONAGA* started operations. Compared to the forecast, transactions display an increment that is out of the bounds of the prediction intervals during the first months of the program start. For the number of CGS operations Figure 5 shows the real time series after *FONAGA* came into operation and the pre-intervention forecast.

Variation increases in the original series after the intervention due to additional resources that came into the program after April 2008. However, despite higher variation, after 2012 the observed guaranteed credit supply starts to align with the forecast series, within the fifty percent confidence intervals. Even though with a more volatile behavior, *FONAGA* can be interpreted as a positive impulse response that lasted approximately 4 years over the regular CGS operations (without the program intervention).



**Figure 5.** Original and forecast series for the total number of guarantees

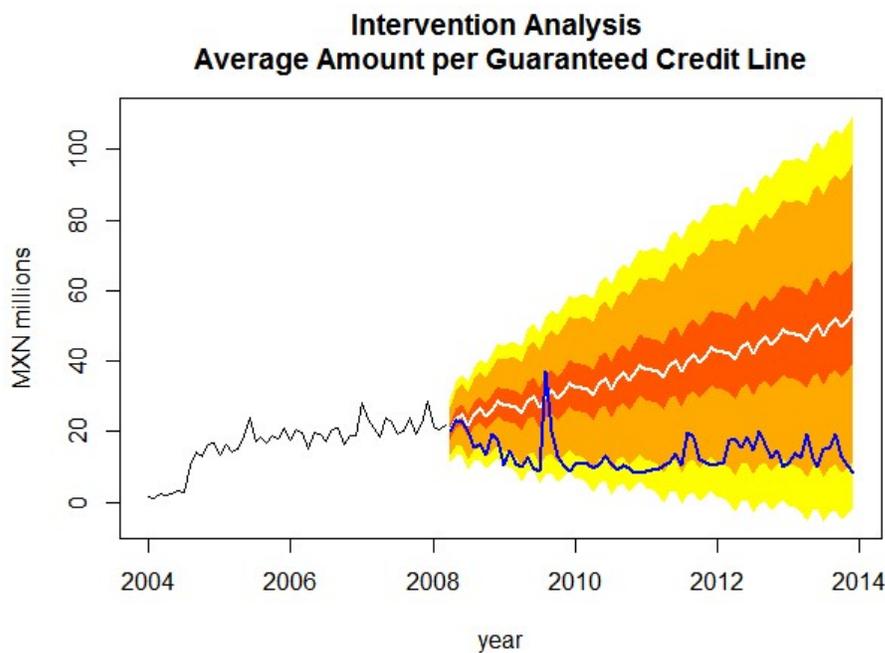
In the case of the total amount of money used to guarantee credit lines, the forecast and the observed time series follow similar behavior. Figure 6 shows that monthly balances accompany the projected series until 2011 when the actual coverages remain steady while the forecasts continue growing.



**Figure 6.** Original and forecast series for the amount of money guaranteed by credit lines.

The balances of credit guaranteed lines experienced the same increase in volatility as in the number of guarantees series, but without evidence of a shock triggered by the program intervention. In contrast, it looks like the level of money resources did not grow as in the forecast ARIMA model. The additional federal resources that were introduced after *FONAGA* implementation only produced higher volatility and *FEGA* reduced its resource contribution.

The last time series provides another perspective. The series was constructed to examine the average amount covered per credit line. The total amount covered per month was divided by the total number of operations issued in the same period of time. As has been shown, the increase in guarantee services or number of guaranteed credit lines combined with a modest growth in money resources, resulted in lower levels of resources needed to issue a guaranteed operation. This is compared with the forecast series where it can be seen that the amount backed by each guaranteed operation falls down below the predictions aligned with the forecast 90% confidence interval as is shown in Figure 7.



**Figure 7.** Original and forecast series for the average amount per guaranteed credit line

Additionally, compared to the predicted trend before the intervention, the amount guaranteed per credit line decreased to levels below 10 MXN millions and stay steady with *FONAGA* influence. This downturn of the average size of guarantees is practically instantaneous after the program start, and it continued for the rest of the observed period, a permanent shift. Table 3 shows the rates of growth for the forecast and the observed series to see the annual impact of *FONAGA* on the overall guarantee operations. In the number of operations series, the guaranteed credit lines should have grown positively through time at a growth rate ranging from 13% to 28% if *FONAGA* was not present. However, the observed series showed *FONAGA* bringing higher growth rates in the first four years, 103% for 2008-2009 and 29% for 2009-2010, then negative growth rates for the next four years to finally end in the last year with 29% which is very similar to the rates of the forecasting series. The same interpretation can be made for the other two series. In the case of the average amount per guaranteed credit line, the observed series shows the downward shift accumulating 54% of decrease in growth rates for the first four years and then maintaining lower levels of growth rates for the rest

of the series.

**Table 3.** Comparison of growth rates for the observed and forecast series

Time Period	Number of operations		Amount guaranteed		Amount per operation	
	Forecast	Observed	Forecast	Observed	Forecast	Observed
2008-2009	0.28	1.03	0.27	0.00	0.25	-0.51
2009-2010	0.22	0.29	0.21	0.25	0.20	-0.03
2010-2011	0.18	-0.00	0.17	0.07	0.17	0.07
2011-2012	0.15	-0.35	0.15	0.11	0.14	0.69
2012-2013	0.13	0.29	0.13	0.42	0.13	0.10

*FONAGA* is shown as contributing to a temporary positive shock in the supply of guarantees by incrementing monthly operations for the first four years. At the same time, *FONAGA* promoted a change in the targeted SMEs that were benefited under the CGS program: after intervention there was a permanent shift to an environment dominated by smaller loan guarantees. Such findings are consistent with the objectives of *FONAGA*. The program was meant to include SMEs that were not being covered by *FEGA*. The shift in the average amount per operation indicates that the *FEGA-FONAGA* dyad included beneficiaries with less financial needs. Most rural SMEs usually require small amounts of credit to start up basic projects. In that sense *FONAGA* is seen as fulfilling the objective of financial inclusion for SMEs that had no financial access before the program started operations.

## 7. Conclusions

The study has evaluated an alternative of public intervention that promotes financial access to rural businesses. Financial access for small agricultural business has been historically scarce and difficult to sustain. From public to private institutions, financial resources to rural enterprises have been constrained or not adequately targeted to produce sustainable growth. Credit Guarantee Schemes enable rural enterprises to access financial resources from private institutions by getting public financial backing. This mode of public financing promotes business relationships between private funds and firms that traditionally have no access to commercial loans due to perceptions of high credit risk. In Mexico, the key CGS programs for rural development are *FEGA* and *FONAGA*. *FONAGA* started operations in 2008 as a means to facilitate *FEGA*'s attempts to expand financial inclusion to the poorest rural businesses. The study findings revealed first that *FONAGA* contributed with a temporary positive shock in the supply of credit guarantees. The shock significantly increased monthly operations for the first four years of *FONAGA*. Interrupted time series and forecasting analysis showed that *FONAGA* enabled *FEGA* to issue credit guarantee operations of lower amount than before the intervention. As a result, the overall CGS program issued more credit guarantee operations with smaller credits after 2008. This result is consistent with the fact that a new segment of program beneficiaries was included. A poorer segment of rural businesses started to receive guarantees to small credits, more low-income beneficiaries were benefited from this change in public program policies. Moreover, after the intervention the time series showed a permanent shift to a system that favored smaller credit guarantees. A shift in CGS allocation was evident when *FONAGA* appeared in 2008. The study explored whether *FONAGA* increased financial access to rural SMEs, and its support to the most in

need rural SMEs. The tested hypothesis was that the presence of *FONAGA* increased financial access for rural businesses, and redirected CGS support to the rural SMEs with basic needs. This shift can contribute to a rural business transformation at the lowest level. Further research should point to that direction to investigate whether improved financial access triggers rural transformation by enhancing productive processes. However, it is important to understand that *FEGA* and *FONAGA* operates as a second-tier financial provider, which can represent a limitation of the analysis. This means that credit guarantee supply depends on financial intermediary demand. If financial intermediaries are not willing to provide financial services in certain locations or do not have enough infrastructure to operate, *FEGA-FONAGA* support will not be able to operate. Another direction for further research can use geographic references to locate the poorest rural regions and link them spatially with CGS geographic allocations. Besides the demand and supply constraints of financial resources, CGS is also dependent on public policy definitions that establish prioritized regions with less economic development. For instance, *FONAGA* since 2013 was allowed to give more coverage for capital-labor credits to SMEs located in the south-southeast region and to the 400 more municipalities that are part of the *National Crusade Against Hunger* (FIRA 2016). It is probable that such policy priorities are not necessarily being fulfilled in practice due to FI preferences for credit allocation, finding some dislocations between FI's service supply and policy-targeted regions. It is important to evaluate rural transformation from the beneficiary viewpoint. Whether financial access impact productive processes in terms of levels of production, efficiencies and business relationships. The current investigation serves as a baseline to comprehensive evaluations that would include additional factors such as the already mentioned productivity or spatial dimension to pursue more accurate results to support the decision-making in rural business transformation. Overall, financial access is key to rural transformation and the efforts aimed to improve public programs in this regard seem to be pointed in the right direction.

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