Differenced Risk Determinants in Portfolio at Risk of the Microfinance Institutions in México (2007-2012)

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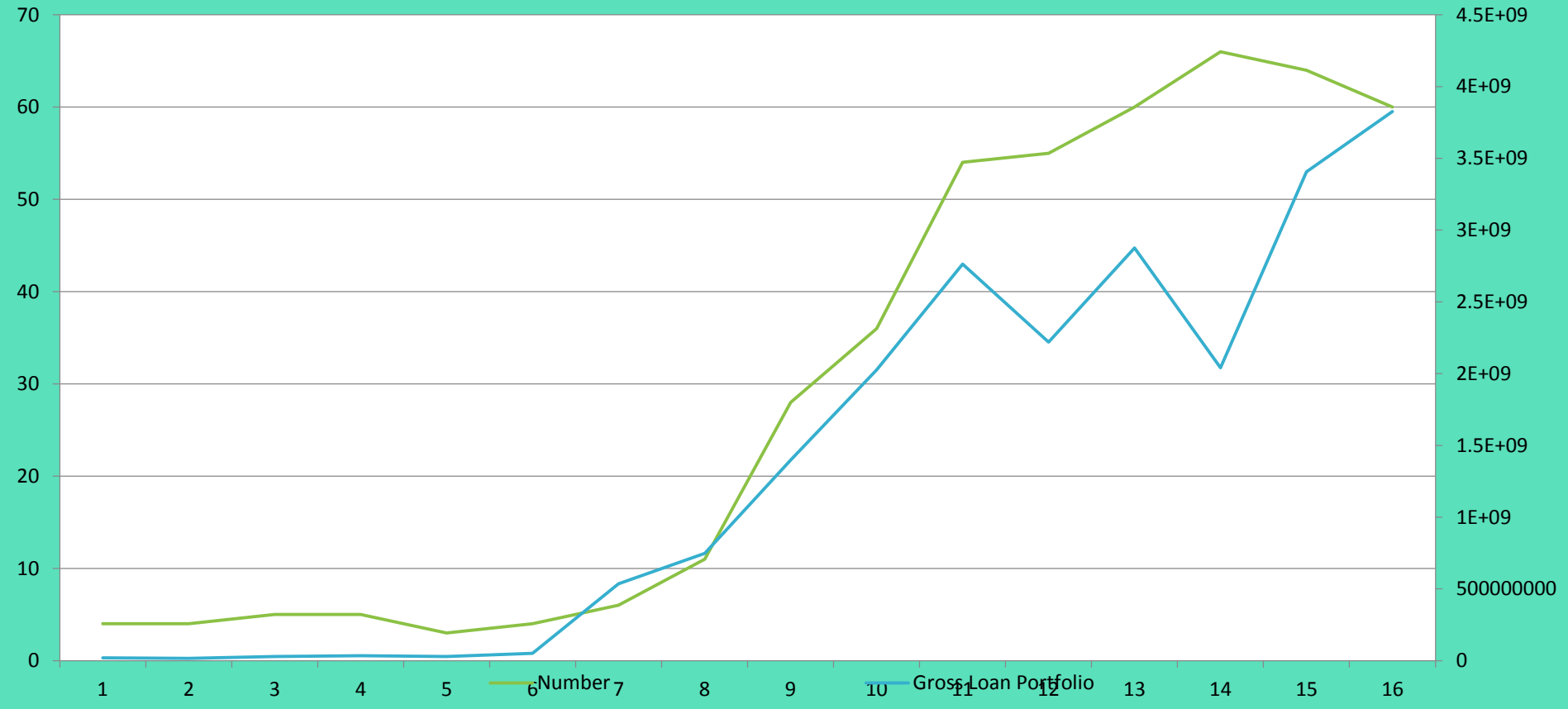
Abstract:

We analyze the way in which the credit risk faced by the Micro Finance Institutions (MFI's) is affected by risk factors as their size, margins, costs, and financial strength. We also analyze the differenced effects of those risk factors on the MFI's credit risk along the time and between MFI's by using two quantile panel regression methodologies. We found that the use of the normality assumption on the traditional panel analysis biases the results when the analyzed variables are not normal by diluting the .75 percentile sample characteristics (the most heterogeneous part of the sample) when the averages necessary for the traditional panel are made.

Figure 1.1 Number of IMF`s and their portfolio in Mexico 1997-2012 Annual frequency.
Source: Own elaboration with data from the Microfinance Information Exchange (MFIX)



MFI is given by two main indicators: operation self sufficiency, *oss*, and the financial self sufficiency, fss. These measures are given by

$$oss = \frac{or}{fe + l - lpe + oe}$$

$$fss = \frac{aor}{fe + l + lpe + oe + ea},$$

where:

- ***or*: Operating revenue,**
- ***fe*: Financial expense,**
- ***l*: Loans,**
- ***ea*: Expense adjustments,**
- ***lpe*: Loss provision expense,**
- ***oe*: Operating expense,**
- ***aor*: Adjusted operating revenue,**

Table I Descriptive Statistics of the Variables in the Model.

	Δ%par 30	Δ%glp	Δ%ife	Δ%ifi	Δ%par90	Δ%rc	Δ%wor	Δ%ygpn	Δ%ygpr
Skewnes	4.346	3.567	2.6840	2.698	7.5197	3.468	7.276	0.264	0.166
Kurtosis	27.709	21.599	13.133	13.573	62.6750	16.635	59.238	3.803	3.605
J-B	42.884	1289.71 1	427.361 1	457.09 2	12308.68	760.63 5	10967	3.000	1.551
Prob.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.223	0.460

Source: Own computation with information of Microfinance Information Exchange MIX

$$\Delta y_{i,t} = f(\Delta y_{i,t-L})$$

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$$\Delta y_{i,t} = \sum_{L=1}^{p_i} \theta_{iL} \Delta y_{i,t-1} + \rho y_{i,t-1} + \alpha_{mi} d_{mt} + \varepsilon_{it}$$

Table II Breitung & Mayer Unit Root Test

	par30	glp	Ife	Ifi	par90	rc	wor	ygpn	Ygpr
Statistic	-1.923	-1.355	-1.158	-2.602	-3.243	-2.492	-1.861	-4.288	-3.385
Prob	0.027	0.088	0.123	0.005	0.000	0.006	0.031	0.000	0.000

Source: Own computation, with information of Microfinance Information Exchange MIX.

Table III Unit Root Levin Lin Chu Test

		Δ%par30	Δ%glp	Δ%ife	Δ%ifi	Δ%par90	Δ%rc	Δ%wor	Δ%ygpn	Δ%ygpr
Statistic	1*	-13.261	-11.315	-10.12	-7.726	-11.281	-89.77	-42.497	-9.744	-9.215
Prob		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Statistic	2**	-14.407	-12.189	-19.46	-10.56	-20.898	-45.69	-25.170	-10.191	-9.712
Prob		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Statistic	3***	-13.490	-6.989	-8.896	-7.194	-10.855	-71.12	-44.955	-10.840	-10.552
Prob		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

1* none, 2** intercept, 3*** intercept and trend

Source: On computation with information of Microfinance Information Exchange MIX

Pooled, Fixed and Random Effects

$$par30_{it} = \beta_0 + \beta_1 glp_{it} + \beta_2 ife_{it} + \beta_3\ ifi_{it} + \beta_4 par90_{it} + \beta_5 rc + \beta_6 wor + \beta_7 yngp + \beta_8 ygpr + \varepsilon_{it}$$

$$par30_{it} = \beta_i + \beta_1 glp_{it} + \beta_2 ife_{it} + \beta_3\ ifi_{it} + \beta_4 par90_{it} + \beta_5 rc + \beta_6 wor + \beta_7 yngp + \beta_8 ygpr + \varepsilon_{it}$$

$$par30_{it} = \beta_0 + u_i + \beta_1 glp_{it} + \beta_2 ife_{it} + \beta_3\ ifi_{it} + \beta_4 par90_{it} + \beta_5 rc + \beta_6 wor + \beta_7 yngp + \beta_8 ygpr + \varepsilon_{it}$$

Table IV Results of Pooled Regression, Fixed Effects and Random Effects

Coefficient	Pooled	Prob	FE	Prob	RE	Prob
glp	-1.3245	0.003	1.7032	0.000	-1.3792	0.001
	(0.431)		(0.450)		(0.428)	
Ife	-1.8645	0.000	-1.9558	0.000	-1.8823	0.000
	(0.267)		(0.273)		(0.264)	
Ifi	5.1378	0.000	5.3481	0.000	5.1746	0.000
	(0.614)		(0.623)		(0.606)	
par90	0.1327	0.000	0.1109	0.000	0.1293	0.000
	(0.021)		(0.023)		(0.021)	
Rc	-0.3169	0.001	-0.3361	0.001	-0.3187	0.001
	(0.094)		(0.099)		(0.093)	
Wor	0.0297	0.003	0.0232	0.025	0.0288	0.002
	(0.009)		(0.010)		(0.009)	
Ygpn	12.7623	0.015	13.6829	0.009	12.8923	0.010
	(5.092)		(5.032)		(5.008)	
Ygpr	-15.4966	0.001	-16.2747	0.001	-15.6044	0.000
	(4.530)		(4.476)		(4.454)	
Cons	-0.0205	0.877	0.1287	0.368	0.0007	0.996
	(0.132)		(0.142)		(0.139)	

Source: Own elaboration whit data from de MIX

Table V Hausman and Breusch - Pagan test for the models in table IV

Test	Statistic	Probability
Hausman	90.41	0.0000
BP-LM	0.01	0.453

Source: Own computation with information of the MIX

$$\hat{q}_\tau = \underset{q \in R}{argmin} \left[(\tau - 1) \dot{\sum_{y_i < q}} (y_i - q) + \tau \dot{\sum_{y_i \geq q}} (y_i - q) \right]$$

$$\beta_\tau = \underset{\beta \in R^k}{argmin} E\left(\rho_\tau (Y - X\beta)\right)$$

Sample Moment 1

$$g_i(b) = \frac{1}{T}\sum_{t=1}^{T} D_{it}\left[(Y_{it} \leq D_{it}^{'}b) - \frac{1}{T}(Y_{is} \leq D_{is}^{'}b)\right]$$

Sample Moment 2

$$h(b) = \frac{1}{NT}\sum_{i=1}^{N}\sum_{t=1}^{T} 1(Y_{it} \leq D_{it}^{'}b) - \tau$$

Table VI Quantile Regression in Panel Data

Coefficient	0.25	Prob	0.5	Prob	0.75	prob	Pooled	Prob
Glp	-0.6488	0.001	-0.8985	0.014	-0.9923	0.255	-1.3245	0.003
	(0.1921)		(0.3559)		(0.8653)		(0.4312)	
ife	-0.5518	0.000	-0.9627	0.000	-1.4148	0.005	-1.8645	0.000
	(0.1102)		(0.2281)		(0.4887)		(0.2671)	
ifi	1.3488	0.000	2.4275	0.000	4.2504	0.002	5.1378	0.000
	(0.2551)		(0.5117)		(1.3381)		(0.6138)	
par90	0.1053	0.000	0.1066	0.000	0.2306	0.000	0.1327	0.000
	(0.0046)		(0.0066)		(0.0238)		(0.0214)	
rc	-0.2981	0.000	-0.2543	0.000	-0.2290	0.086	-0.3170	0.001
	(0.0481)		(0.0640)		(0.1315)		(0.0938)	
wor	0.0092	0.003	0.0135	0.027	0.0195	0.151	0.0296	0.003
	(0.0030)		(0.0060)		(0.0134)		(0.0095)	
ygpn	8.6643	0.002	15.0184	0.001	13.0840	0.088	12.7623	0.015
	(2.7550)		(4.2734)		(7.5611)		(5.0923)	
ygpr	-8.0241	0.003	-15.0715	0.000	-14.8392	0.019	-15.4966	0.001
	(2.5608)		(3.7973)		(6.1519)		(4.5296)	
Cons	-0.0304	0.669	0.2328	0.040	0.2783	0.229	-0.0205	0.877
	(0.0706)		(0.1114)		(0.2292)		(0.1322)	

Source: Own computation with information of Microfinance Information Exchange MIX

Table VII Quantile Fixed Effect, Regression in Panel Data with Non-Additive Error Term Portfolio at Risk (par30) in function of the change in the gross loan portfolio (glp) and time

Coefficient	0.25	Prob	0.5	Prob	0.75	Prob	Pooled	Prob
Glp	-2.9	0.7817	4.3	0.2177	1.4	0.4739	1.3476	0.000
	(3.7279)		(5.5148)		(21.443)		(0.3294)	
α_{2007}	0.7086		-2.3541		-0.0046			
α_{2008}	0.2506		-0.1288		0.9215			
α_{2009}	0.9094		-1.3976		-0.0918			
α_{2010}	0.7126		-1.7179		-0.2843			
α_{2011}	0.0867		-0.0522		0.9055			
α_{2012}	0.6183		-1.2904		-0.2505			

Source: Own computation with information of Microfinance Information Exchange MIX

Table VIII Quantile Fixed Effect, Regression in Panel Data with Non-Additive Error Term Portfolio at Risk (par30) in function percent variation of portfolio at risk 90 (par90) and time

Coefficient	0.25	Prob	0.5	Prob	0.75	Prob	Pooled	Prob
par90	0.3	0.1614	0.90	0.0129	3.5	0.0001	0.1473	0.000
	(0.3035)		(0.4042)		(0.9551)		(0.0357)	
α_{2007}	-0.4092		-0.0147		1.6192			
α_{2008}	-0.2113		-0.1676		0.3484			
α_{2009}	-0.1439		-0.2059		-0.5050			
α_{2010}	-0.3300		-0.0145		1.0647			
α_{2011}	-0.0323		0.0885		0.1822			
α_{2012}	-0.1535		0.0966		1.2372			

Source: Own computation with information of Microfinance Information Exchange MIX

Table IX Quantile Fixed Effect, Regression in Panel Data with Non-Additive Error Term Portfolio at Risk (par30) in function of interest and fee income (ifi) and time

Coefficient	0.25	Prob	0.5	Prob	0.75	Prob	Pooled	Prob
Ifi	-5	0.3955	5	0.0257	-5	0.0007	-0.002	0.768
	(0.000)		(0.000)		(0.000)		(0.008)	
α_{2007}	75.43		-0.4771		260.59			
α_{2008}	80.01		0.0805		260.19			
α_{2009}	85.81		0.1068		265.37			
α_{2010}	90.94		-0.6970		269.63			
α_{2011}	97.39		-0.0908		276.69			
α_{2012}	99.86		0.2004		280.24			

Source: Own computation with information of Microfinance Information Exchange MIX

Conclusions

As we content at the beginning of the paper, the Micro Finance industry became competed along the time of the sample, especially on the crisis years, but this competition affected in different ways to the firms on the industry. Our quantile regressions showed that the bigger (and most exposed) companies don't take into account; for their credit risk managemet; variables as the change on the gross loan portfolio, *glp*, the change on the risk coverage, *rc*, the change of the write off ratio, *wor*, or the yield on nominal gross portfolio, *ypgn*.

We found that there is a differenced behavior of the firms depending on their risk exposure. This is also noted because the significant parameters differ, sometimes substantially, between quartiles and along the time. This means that the subprime crisis affected in a different way each quartile on the sample and that the quality of the borrower changes over the time.

We also give some empirical evidence on the way in which the normality assumption affects the panel regression results. Under the normality assumption, the pooled model was the best, implying that all the MFI's behaves in the same way and that this behavior is constant along the time. But when we introduced the quantile regression, we gave empirical evidence of differenced responses, along the time and between quartiles, to changes in some credit risk factors. Also, we found that the .75 percentile of the IMF's sample is the source of a big part of heterogeneity, because is in that quartile where most of the regressors became statistically non significant.

MFI's analyzed on the paper		
ALSOL	Compartamos Banco	Forjadores de Negocios
APROS	Conserva	Pro Mujer - MEX
CAME	FINCA – MEX	SemiSol
COCDEP	FinComun	SOLFI
Vision Fund - MEX		

¡Muchas Gracias!