Do Solidarity Credit Unions Have the Same Efficiency as those Market-based?

An efficiency analysis of Brazilian credit unions

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- Since 1959 – 60 years old
- More than 30.000 students
- 65 undergraduate courses

- Business School
  - Undergraduate Courses: Administration, Accounting, Economics, Marketing, Tourism
  - Masters and doctorade in administration
  - Masters course in management of cooperatives


Panamá
(Panama)
Venezuela
Bogotá
Cali
Colombia
Guyana
Guyane
(French Guiana)
Suriname
Roraima
Amapá
Quito
Ecuador
Rio Grande
do Norte
Amazonas
Pará
Ceará
Maranhão
Paraíba
Piauí
Brasil
(Brazil)
Perú
(Peru)
Acre
Pernambuco
Rondônia
Tocantins
Alagoas
Lima
Mato
Grosso
Bahia
Salvador
Sergipe
Goiás
Brasília
La Paz
Bolivia
Minas
Gerais
Espírito
Santo
Mato Grosso
do Sul
Belo
Horizonte
São Paulo
Rio de
Janeiro
Paraguay
São Paulo
Rio de
Janeiro
Asunción
Paraná
Curitiba
Chile
Santa
Catarina
Rio Grande
do Sul
Santiago
Uruguay
Buenos
Aires
Montevideo
Argentina

Cooperative Principles
ICA (1995)

1. Voluntary and open membership
2. Democratic member control
3. Member economic participation
4. Autonomy and independence
5. Education, training, and information
6. Cooperation among cooperatives
7. **Concern for community**
   - ***Cooperatives work for the sustainable development of their communities through policies approved by their members***

Two Fundamental Objectives

- Collective development
- Positive financial outcome
- Challenge →

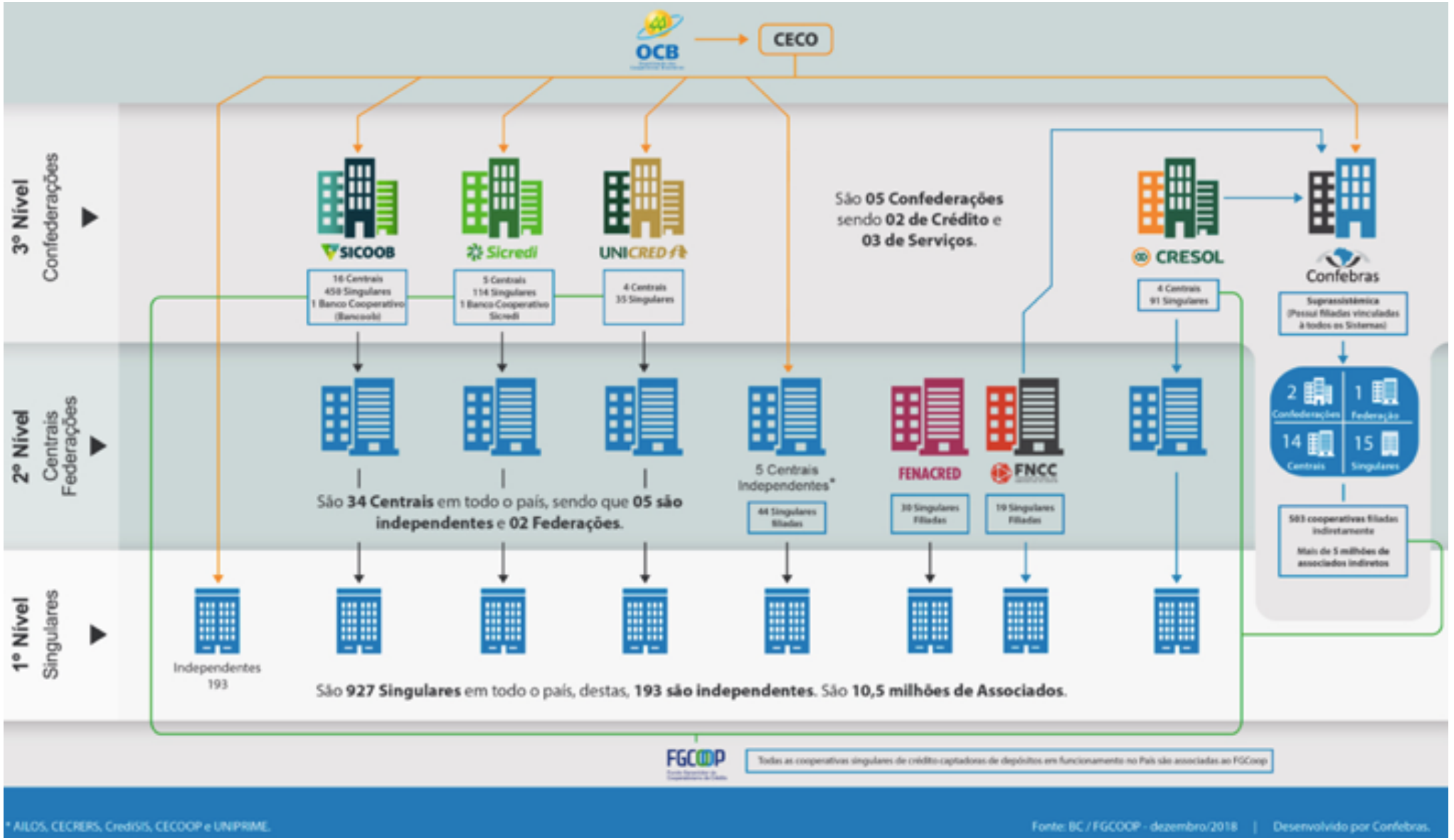
7. Concern for community

- Credit unions nowadays …
  - (at least in Brazil)

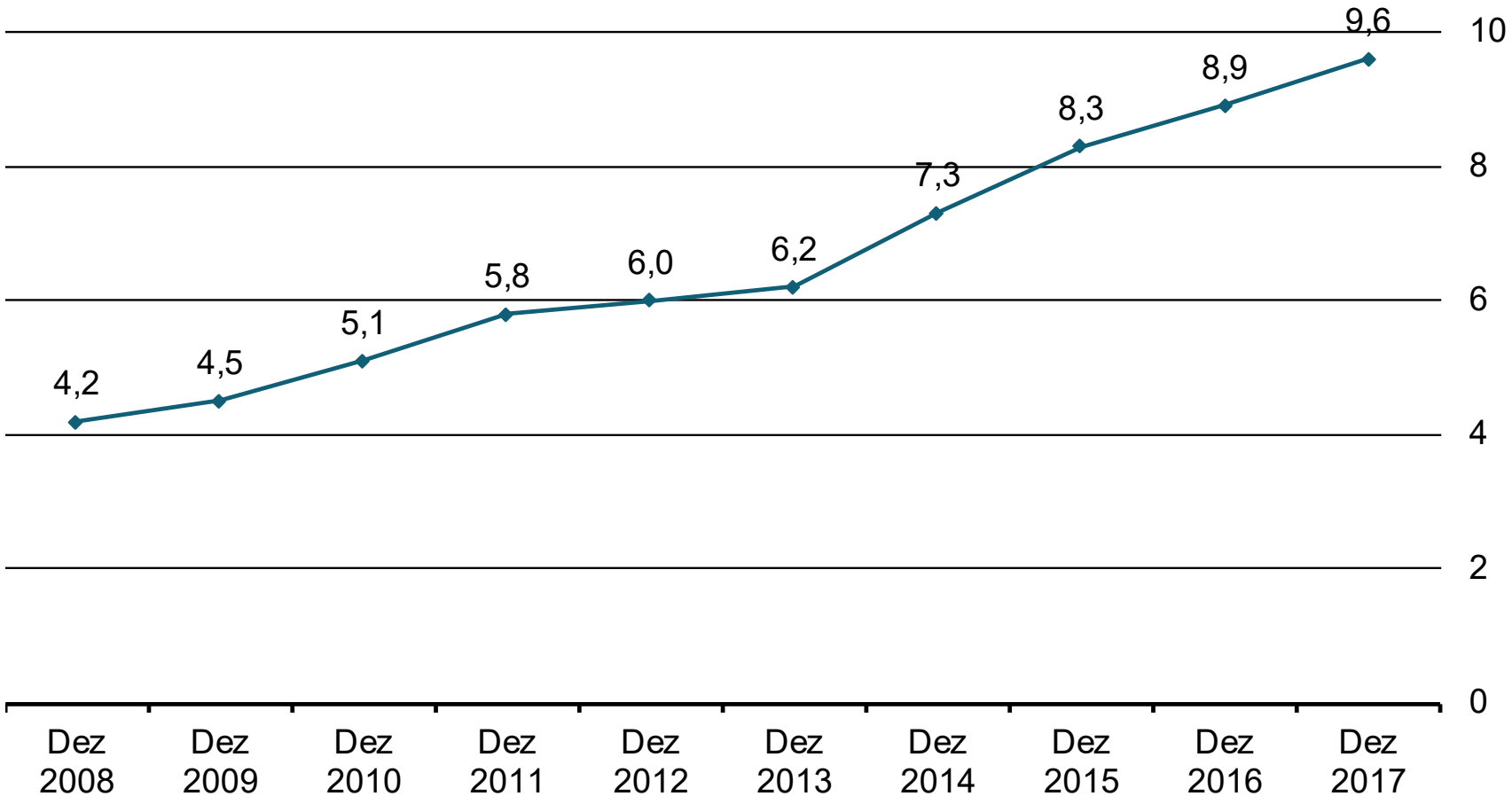
⬇️ focus on mitigate social inequalities

⬆️ focus on economic-financial performance

Organization of Brazilian Credit Unions



Members (million)



Main Aggregates (R$ billion) and Participation (%) in the Brazilian Financial Market

	2013	2014	2015	2016	2017
Total assets	92,2	110,6	130,5	154,2	178,5
%	1,41	1,49	1,58	1,87	2,15
Risk-classified credit portfolio	57,6	67,7	76,0	83,6	95,9
%	1,95	2,04	2,09	2,42	2,81
Total deposits	50,6	61,4	74,2	91,0	105,6
%	2,69	3,11	3,55	4,26	4,50
Reference equity	19,8	23,5	28,8	33,1	38,2
%	2,57	2,93	3,50	3,87	4,24

- Despite of their consistent increase, credit unions have a low participation
  - The Brazilian financial market has a high concentration with a few number of private banks

Two Systems of Credit Unions in Brazil

- Market-based
  - "Commercial credit"
  - Alternative to traditional banks

- Solidarity-based
  - Solidarity credit
  - Provide access to credit lines and other services to those that are of little interest to the conventional financial market

Solidarity-based
Target people

- Family farmers, micro entrepreneurs, freelancers and liberal professionals

- Normally with a profile of
  - lower income bracket
  - no collateral
  - low qualification manage a business, which is often related to their subsistence.

Efficiency of Solidarity Credit

- Challenges common to all agents
  - Fierce competition, taxes, economic crisis, default, high operational costs, lower spread

- Despite limitations, there are coops operating in this sector

Main question:

→ Is this an economically feasible and sustainable model?

This Study

- Analyze the technical and financial efficiency of Brazilian Credit Unions

- Comparison of coops
  - Social focus – offer of microfinance options
  - Market-based – offer of mercantile credit

→ Most quantitative studies on microcredit do not consider the cooperative management model

Methodology

- Quantitative study
- Data from 2 Brazilian credit union systems: CRESOL and SICREDI
  - Population: 927 singular coops
  - Sample: coops of Paraná State
    - 45 from Cresol
    - 24 from SICREDI
- Accounting data provided by Brazilian Central Bank: 2014, 2015 and 2016

CRESOL
Cooperative System of Solidarity Rural Credit

Central coops	4
Affiliated coops	91
Service stations	507
Members	503.769
Total Assets	R$ 2.6 billion

- The history of the CRESOL system has been linked to solidarity credit since its foundation, especially with regard to family farming with solidarity interactions

→Its credit portfolio is almost entirely composed of solidarity credit operations

SICREDI

Central coops	5
Affiliated coops	114
Service stations	1.684
Members	4 million
Total Assets	R$ 77 billion

- Founded in 1902
- Chosen to represent the market-based cooperative model

→Its credit portfolio is mostly composed of operations similar to those of commercial banks

Methodology
Analysis of relative efficiency

1) Data Envelopment Analysis – DEA

2) Malmquist Index – MI

3) Input variables
   - Total cost of employees, administrative costs, Non-administrative costs

4) Output variables
   - Volume of credit operations, net results, total assets

Methodology
Analysis of Relative Efficiency

- Data Envelopment Analysis – DEA
  - Most widely used technique to measure the operational and financial relative efficiency of financial institutions
  - Relative efficiency index obtained through mathematical programming

$$Max\ h_k = \sum_{r=1}^{m} u_r y_{rk} - u_k$$

Subject to

$$\sum_{i=1}^{n} v_i x_{ik} = 1$$

$$\sum_{r=1}^{m} u_r y_{rj} - \sum_{i=1}^{n} v_i x_{ij} - u_k \leq 0$$

$$u, v \geq 0$$

Where:

h_k = efficiency indicator for the DMU k

y_{rj} = quantity of product r produced by the DMU j;

x_{ij} = quantity of input i consumed by the DMU j;

u,v = weights obtained by the mathematical programming process;

m = quantity of products;

n = quantity of inputs.

Methodology
Analysis of Relative Efficiency

- Malmquist Index – MI
  - It complements the DEA analysis – evaluates the change in productivity of a DMU over time
  - Measure to what extent the variation in productivity resulted from exclusively technical factors and to what extent a change in the environment affected the production process in the most generalized way

$$M_P(X^{t+1},Y^{t+1},X^t,Y^t)=\left[\frac{D_P^{t+1}(X^{t+1},Y^{t+1})}{D_P^t(X^t,Y^t)}\right]\left[\frac{D_P^t(X^t,Y^t)\times D_P^t(X^{t+1},Y^{t+1})}{D_P^{t+1}(X^t,Y^t)\times D_P^{t+1}(X^{t+1},Y^{t+1})}\right]^{1/2}$$

Where:

$D^t_P\,(x^t,y^t)$ e $D^{t+1}_P\,(x^{t+1},y^{t+1})$ represents the distance to the efficiency frontier in the period *t* and *t+1* respectively

Results

- Variation of averages over the period

System	Year	Non-administrative expenditure	Net surplus
CRESOL	2014	2,024,965.33	1,350,414.49
	2015	2,383,705.18	8,362,055.85
	2016	3,397,441.96	3,964,683.11
SICREDI	2014	61,701,520.24	10,567,914.38
	2015	93,881,589.58	16,896,658.49
	2016	112,407,276.15	14,185,152.71

- These variations have a direct impact on the economic and financial performance of the cooperatives, as the ideal is to minimize expenses and earn higher profits, optimizing the activity.
  - CRESOL was more efficient

Efficiency Scores

Year	System	Obs.	Mean	Std. Deviation	Minimum	Maximum	Efficient DMUs (qty)	Efficient DMUs (%)
2014	CRESOL	45	0.89	0.14	0.48	1.00	13	28.89%
	SICREDI	24	0.85	0.17	0.55	1.00	10	41.67%
2015	CRESOL	45	0.95	0.07	0.70	1.00	12	26.67%
	SICREDI	24	0.87	0.13	0.56	1.00	8	33.33%
2016	CRESOL	45	0.89	0.12	0.42	1.00	11	24.44%
	SICREDI	24	0.77	0.17	0.38	1.00	5	20.83%

- The CRESOL coops had higher mean efficiency scores than SICREDI
  - But SICREDI had a higher proportion of coops with maximum efficiency (equal to 1) in 2014 and 2015

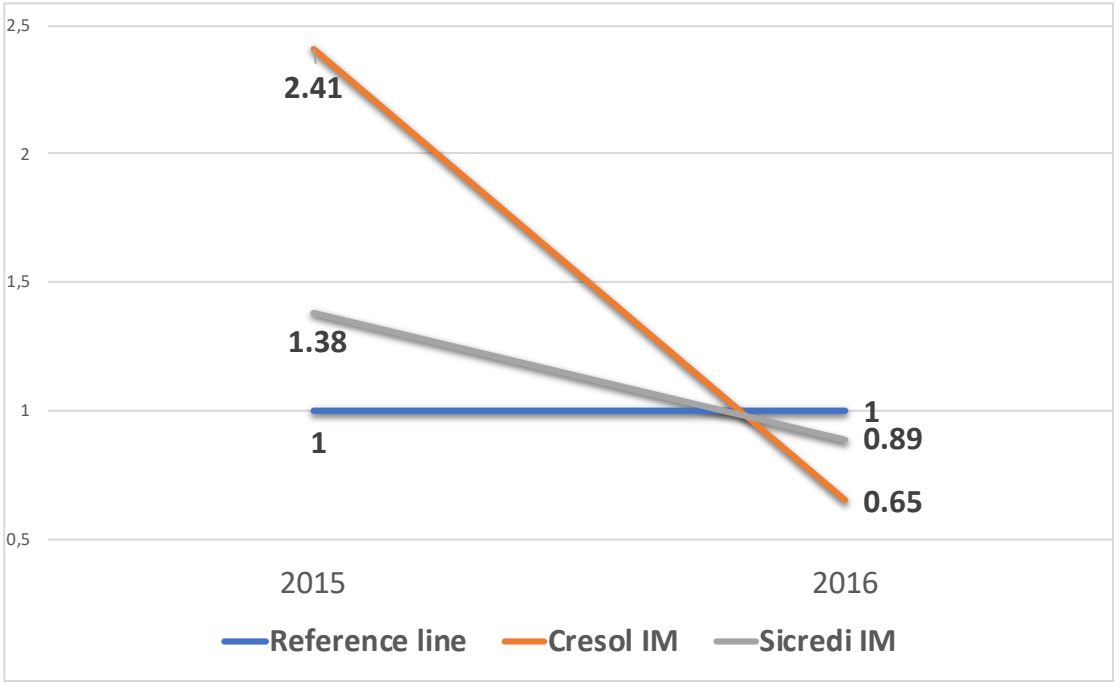
- Over the period, both had decreased their proportion of coops with maximum efficiency
  - Reflection of the 33% reduction in net surplus during the period

Correlation with Efficiency Scores

	Expenses with staff	Administrative expenditure	Non-administrative expenditure	Volume of credit	Net surplus	Assets
2014	0.09	0.09	0.09	0.18	0.23	0.17
2015	-0.08	-0.07	-0.05	0.05	0.17	0.02
2016	-0.09	-0.08	-0.07	0.04	0.09	0.01

- Assets – efficiency is not related to size (low correlation)
- Net surplus – highest correlation
- Expenses with staff – highest negative correlation
  - Cost of payroll directly influenced efficiency
  - Need to optimize the productivity
  - As this variable is directly linked to the net surplus variable, investment in professional training could be an important alternative when it comes to achieving better results, thus raising the efficiency rate of the cooperatives.

Changes in Efficiency Over the Time



- Graph shows the rate at which the two systems drew near to or distanced themselves from the efficiency frontier (average MI)
- From 2014 to 2015, both systems moved towards the efficiency frontier – CRESOL was better with 2.41
- Between 2015 and 2016, both systems saw a fall in their MI, with values lower than 1, moving away from the efficiency frontier

Conclusions

- Based on results of efficiency scores (and their correlations with variables) and the evolution of efficiency measured by MI, in the analysed context:

  - The cooperative model based on solidarity credit is efficient from a technical and financial viewpoint

  - It may be concluded that solidarity credit, in addition to its social importance, has potential generate and maintain technical efficiency
    - Model showed similar efficiency to the market-based model of credit unions

Conclusions

- The results also showed the need for stricter monitoring of efficiency rates
  - most of the DMUs (76.81%) did not present maximum efficiency

- Complementary issues
  - the evaluation of expenditure on staff, thus avoiding unnecessary costs, without neglecting investments in permanent qualification and;
  - the development of campaigns to encourage members to invest their income in the cooperative

- **Thank you**

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