

10 Anos do Projeto de  
Juros e Spread Bancário

*Seminário sobre Riscos,  
Estabilidade Financeira e  
Economia Bancária do  
Banco Central do Brasil*

# Macroeconomic Drivers of Brazilian's Enterprise Default

2010, August

# Macroeconomic Drivers of Brazilian's Enterprise Default

## Introduction

Substantial credit growth:

- from 27.4% of GDP at 2001/01;
- to 45.7% of GDP at 2010/06.

Even in 2009, from 40.8% at 2008/12 to 45.0% at 2009/12.

More than 53% of Brazilian's bank total assets were credit operations in 2008/12.

Despite that, few studies about Brazilian's enterprise default.

# Macroeconomic Drivers of Brazilian's Enterprise Default Credit Default Models

Wide model's variety, among them, we chose the CreditPortfolioView approach or macroeconomic-based model

Chan-Lau (2006):

“Macroeconomic-based models are motivated by the observation that default rates in the financial, corporate, and household sectors increase during recessions. This observation has led to the implementation of econometric models that attempt to explain default indicators, such as default probabilities or default rates, using economic variables. The econometric models can be further classified depending on whether they **allow feedback between financial distress and the explanatory economic variables.**”

# Macroeconomic Drivers of Brazilian's Enterprise Default

## Methodology - Data

### Credit Default Rate (CDR):

Source – Brazilian Central Bank Credit Information System  
(SCR – Sistema de Informações de Crédito do Banco Central do Brasil)

$INADIM\_PJ = \frac{\text{The number of credit exposures to corporate obligors between 61 and 90 days past}}{\text{The number of fully current credit exposures to corporate obligors due 90 days earlier}}$

### Macroeconomic variables selection - Main factors observed (ordered by importance):

1. The most frequent in the financial and economic literature;
2. Showed relevant correlation with CDR;
3. Attempt to use the fewest number of variables as possible (only 81 observations);
4. Forecast available in the Central Bank Market Expectation System.

# Macroeconomic Drivers of Brazilian's Enterprise Default

## Methodology - Data

Macroeconomic variables selected:

SELIC – Selic Interest Rate;

PRODUCAO – Industrial Production;

DOLAR - Exchange Rate (R\$/US\$).

To use the variables in the model, they need to be transformed:

SELIC -> Log and difference -> D\_L\_SELIC;

PRODUCAO -> Deseasonalize, log and difference -> D\_L\_PRODUCAO\_DES;

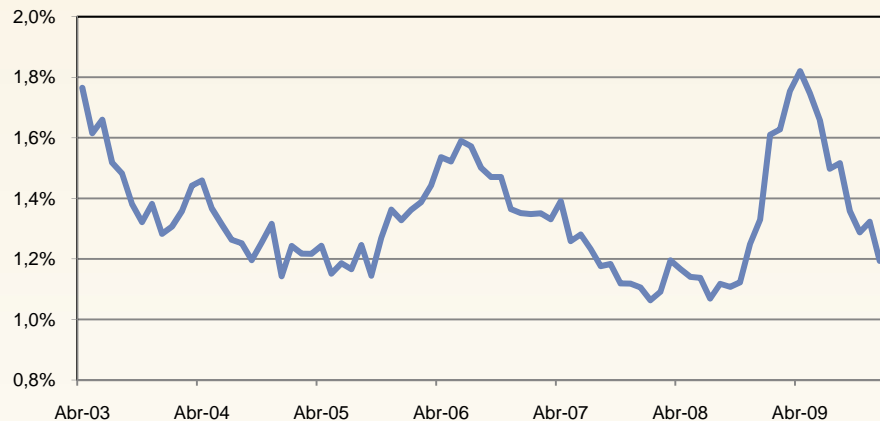
DOLAR -> Log and difference -> D\_L\_DOLAR;

INADIM\_PJ -> Deseasonalize and log -> L\_INADIM\_PJ\_DES.

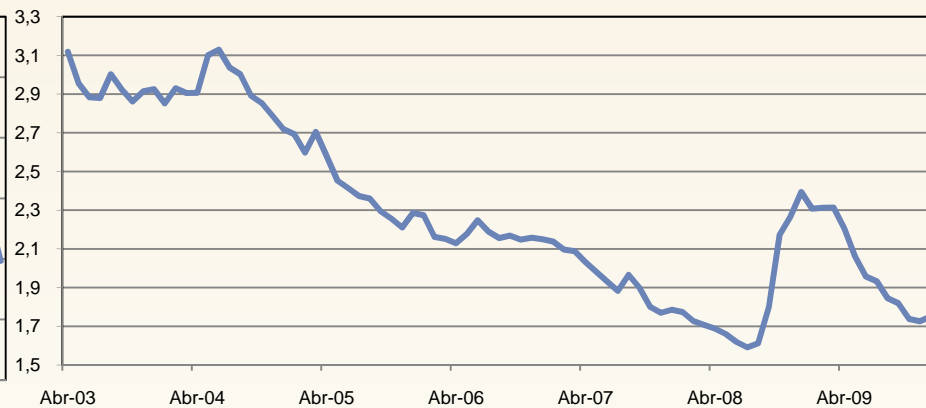
# Macroeconomic Drivers of Brazilian's Enterprise Default

## Methodology - Model

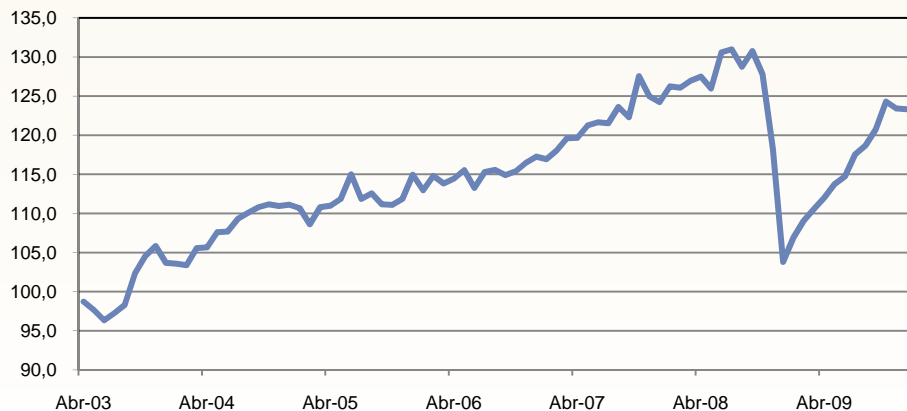
INADIM\_PJ



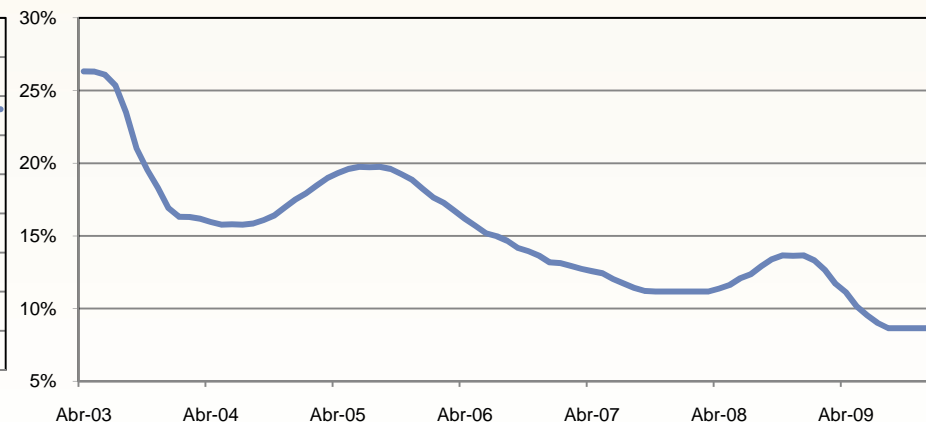
DOLAR



PRODUCAO



SELIC



# Macroeconomic Drivers of Brazilian's Enterprise Default

## Methodology - Models

Estimated Model -> Vector Autoregressive with Exogenous Variables  
VARX (p, s)

$$y_t = \delta + \sum_{i=1}^p \theta_i y_{t-i} + \sum_{i=0}^s \gamma_i x_{t-1} + \epsilon_t$$

Where:

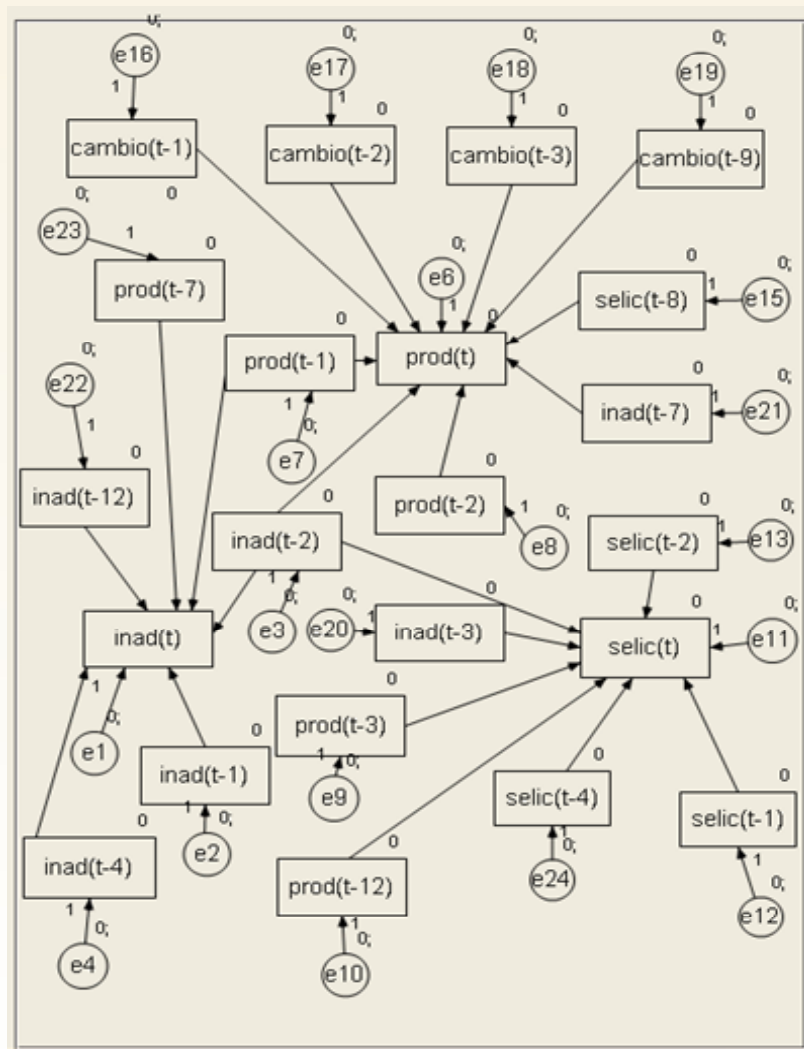
$$y_t = (L\_INADIM\_PJ\_DES_t, D\_L\_PRODUCAO\_DES_t, D\_L\_SELIC_t)'$$

$$x_t = (D\_L\_DOLAR_t)'$$

# Macroeconomic Drivers of Brazilian's Enterprise Default

## Methodology - Models

Because of the few available observations (81) we applied a Bayesian Structural Equation Modeling (SEM) framework using the VARX results as prior information.





# Macroeconomic Drivers of Brazilian's Enterprise Default

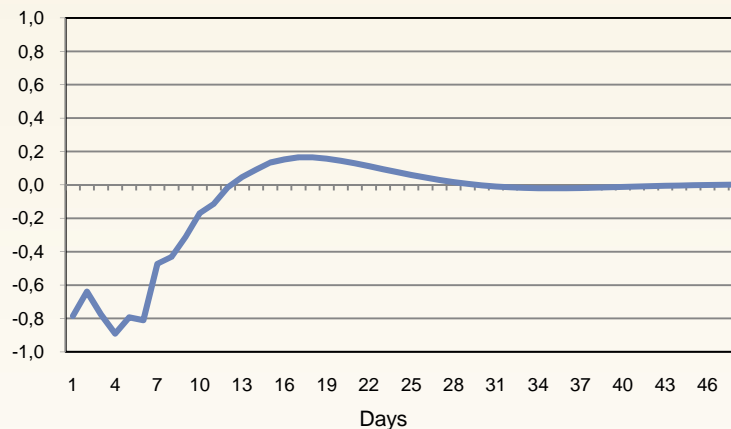
## Methodology - Results

Equation	Variable	VARX (12,9) Model				SEM Model
		Estimated Parameter - VARX	Standard Error	t Value	Probability >  t	Estimated Parameter - VARX - SEM - Mean
Credit Default Rate	1	-1,2256	0,2782	-4,4100	0,0001	-0,4240
	L_INADIM_PJ_DES (t-1)	0,6600	0,1002	6,5900	0,0001	0,7840
	D_L_PRODUCAO_DES (t-1)	-0,7868	0,1712	-4,5900	0,0001	-0,7850
	L_INADIM_PJ_DES (t-2)	0,5017	0,1242	4,0400	0,0002	0,4460
	L_INADIM_PJ_DES (t-4)	-0,3049	0,0719	-4,2400	0,0001	-0,3300
	D_L_PRODUCAO_DES (t-7)	0,3947	0,1703	2,3200	0,0254	0,2610
	L_INADIM_PJ_DES (t-12)	-0,1390	0,0443	-3,1400	0,0031	0,0010
Industrial Production	D_L_DOLAR (t-1)	-0,2960	0,0474	-6,2400	0,0001	-0,0960
	D_L_DOLAR (t-2)	-0,1760	0,0545	-3,2300	0,0024	-0,0800
	D_L_DOLAR (t-3)	-0,2978	0,0578	-5,1500	0,0001	-0,0740
	D_L_DOLAR (t-9)	-0,2207	0,0525	-4,2100	0,0001	-0,0400
	D_L_PRODUCAO_DES (t-1)	-0,2111	0,1007	-2,1000	0,0422	0,0300
	L_INADIM_PJ_DES (t-2)	0,0661	0,0189	3,5000	0,0011	-0,0020
	D_L_PRODUCAO_DES (t-2)	-0,3423	0,0997	-3,4300	0,0014	-0,0960
Selic Interest Rate	L_INADIM_PJ_DES (t-7)	-0,0646	0,0187	-3,4500	0,0013	0,0020
	D_L_SELIC (t-8)	-0,3011	0,0779	-3,8700	0,0004	-0,0310
	D_L_SELIC (t-1)	0,6029	0,0960	6,2800	0,0001	0,8330
	L_INADIM_PJ_DES (t-2)	-0,1161	0,0354	-3,2800	0,0021	-0,0030
	D_L_SELIC (t-2)	0,4344	0,1231	3,5300	0,0010	0,1290
	L_INADIM_PJ_DES (t-3)	0,1166	0,0354	3,3000	0,0020	0,0040
	D_L_PRODUCAO_DES (t-3)	0,1659	0,0645	2,5700	0,0138	0,2480
D_L_PRODUCAO_DES (t-3)	D_L_SELIC (t-4)	-0,2527	0,0793	-3,1900	0,0027	-0,2070
D_L_PRODUCAO_DES (t-12)	0,1506	0,0532	2,8300	0,0071	0,1190	

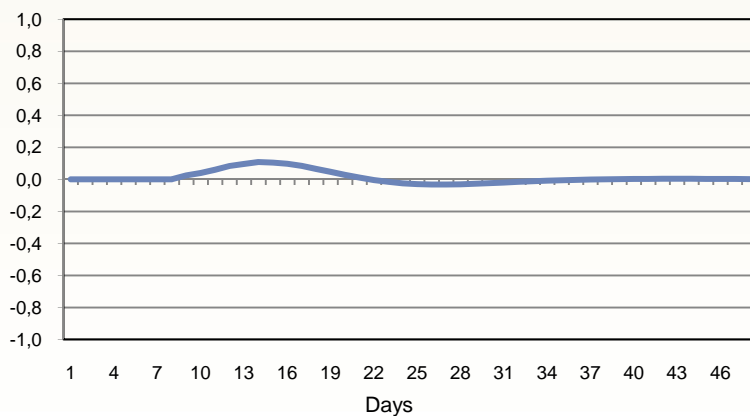
# Macroeconomic Drivers of Brazilian's Enterprise Default Methodology – Results

## Simple Impulse Response of CDR by Variable

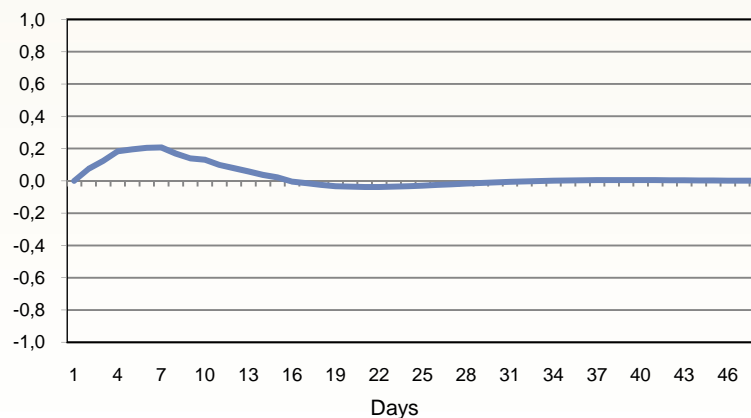
PRODUCAO



SELIC



DOLAR



# Macroeconomic Drivers of Brazilian's Enterprise Default

## Methodology - Conclusions

### Conclusions:

- Selic Interest Rate has an impact on Brazilian's Enterprise Default. As expected, a Selic increase cause an increase on default rate later on;
- The Exchange Rate (R\$/US\$) has an impact on Brazilian's Enterprise Default. As expected, a Real depreciation cause an increase on default rate later on;
- The Industrial Production (a proxy of the economic activity) has the most significant impact on Brazilian's Enterprise Default . As expected, an increase in the economic activity cause an immediately decrease on default rate.
- So we can estate that, despite undesirable fluctuations in the Selic Interest Rate and in the Exchange Rate, **the implementation of macroeconomic policies that fosters sustained growth of the economic activity is the key factor to maintain low levels of credit default among the Brazilian's Enterprises.**