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## FINANCIAL CRISIS – MACRO AND MICROECONOMIC CONNOTATIONS. MEASURES OF COMING OUT OF CURRENT FINANCIAL CRISIS

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**Abstract:** *Financial markets have the essential role of channeling funds to those individuals or companies that have productive investment opportunities. If the financial system does not fulfill its role properly, the economy cannot operate efficiently and economic growth is stunted.*

*Financial instability takes place when financial system shock infringes on information flux. Thus, the financial system can no longer achieve its purpose of channeling funds to those that hold investment opportunities.*

*A series of theoretical aspects concerning international financial crises, financial crises on a company level, as well as the role of the Basel II Accord in stimulating risk management throughout financial crises.*

*The paper ends with presentations of aspects concerning prudential regulation at a macroeconomic level – measures to alleviate the current financial crises. Thus, the greater a company's contribution to the risk in the financial system, the greater the demand for funds, the Pigovian tax, or the compulsory insurance premium.*

**Keywords:** *monetary crisis, financial crisis, banking system, prudential regulation, The Basel II Accord, financial instability, financial system shock*

### 1. THEORETICAL ASPECTS OF THE INTERNATIONAL FINANCIAL CRISIS

The international financial crisis represents a series of circumstances in which international dimension worsens the effects of a crisis.

The phenomenon of international contagion<sup>1</sup> is represented by<sup>2</sup>:

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<sup>1</sup> Reinhart C.M., Vegh C.A., *The Unholy Trinity of Financial Contagion*, The Journal of Economic Perspectives, Vol.17, No.4, Autumn 2003. *Contagion* is an episode in which manifests a significant number of effects in some countries after an event - that is, when the consequences are "fast and furious" and develop

- common shock (shocks reflected in common household use items);
- commercial connections transfer relative price and income shock from one country to another;

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along a few hours or days. This reaction is the contrast with the case that international response to the news is silent. External common shocks, such as changes in interest rates or oil prices, are automatically included in the definition of contagion. Only when there is excessive correlation between economic and financial variables among countries in response to a shock joint can be considered as is contagion

<sup>2</sup> Ely R.T., *International Financial Crises: Causes, Prevention and cures*, Lecture by Lawrence H. Summers

- competitive devaluation between competing countries, either amongst each other or on a third market, which explains the lowered value of currencies in many countries;
- financial connections which create correlations between markets;
- lack of liquidity on the market can accentuate contagion;
- investor irrationality: the panic or herd effect;
- reputational externality: crisis in one country affects perceptions and expectations about conditions and vulnerabilities of other countries.

### *International financial instability*<sup>3</sup>

Financial markets have the role of channeling funds to those individuals or companies that have productive investment opportunities. If the financial system does not fulfill its role adequately, the economy can no longer operate efficiently and economic growth is stunted. As a consequence, a financial system can be confronted with information asymmetry problems, in which one part of those involved in a contract knows less (or more) information than the other. Informational asymmetry leads to two essential problems for the financial system: adverse selection and moral hazard.

Adverse selection is in effect before the financial transaction takes place. Akerlof's "Market of Lemons" developed in 1970 showed that second hand car buyers that were partially informed did not want a vehicle priced very low, because they believed the car was suspiciously cheap. Whereas capital markets are concerned, partially informed creditors aren't tempted to give out loans associated with high interest rates, because they believe those that take such loans are very likely not to pay them. The process by which a creditor tries to separate a good debtor from a bad one is an imperfect process, and the fear of adverse selection influences creditors to reduce the quantity of loans they would otherwise give out.

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<sup>3</sup> after Mishkin F.S., *Global Financial Instability: Framework, Events, Issues*, The Journal of Economic Perspectives, vol.13, No.4, Autumn 1999.

Moral hazard takes place after the transaction has been carried out. It arises because a debtor is stimulated to invest in high risk projects with high payout for the debtor, but the creditor suffers the greater part of the damage if it fails. The potential conflict of interest between the debtor and the creditor implies the fact that many creditors will borrow less than they usually would, so that loans and investments will be suboptimal.

From that regard, the purpose of financial intermediaries, including commercial bank, economic institutions, insurance companies, mutual funds and pension funds, of which banks hold the most important role, is that they have both the capacity and instruments necessary to address information asymmetry issues.

Financial instability takes place when financial system shock infringes on the information flux. Thus, the financial system no longer fulfills its role to channel funds to those that hold investment opportunities. If the financial instability is severe enough, it can lead to almost total interruption of the financial market, a situation generally classified as financial crisis.

There are four essential factors to be considered in generating financial instability:

- the deterioration of balances in the financial sector;
- interest rate growth;
- uncertainty growth;
- deterioration of bilateral non-financial accounts due to fluctuating prices.

## **2. HIGHLIGHTING FINANCIAL CRISIS ON A COMPANY LEVEL**

Acute financial crisis on a company level is manifested when the company involved applies the country's law of bankruptcy and restructuring. There are several stages of financial status on a company level:

- financial stability;
- no dividends awarded, or their payout reduced;
- lack of loan financing
- filing for bankruptcy
- actual bankruptcy and liquidation



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Modeling financial crisis on a company level. Model types.

*Regression analysis*

Regression analysis<sup>4</sup> is one of the most commonly used methods in econometric approaches and handles description and evaluation of dependencies between a dependent or explained variable and one or more independent or explicative variables, with the purpose of estimating and/or predicting medial evolution of the researched population.

The simplest econometric model is the one in which an endogenous variable is explained by an exogenous variable.

Noting  $y$  as the dependent variable with  $x_1, x_2, \dots, x_m$  as independent variables, we have the following discussion:

a) if  $m=1$ , we have single variable  $x$  and therefore have what is called a simple (unvaried) regression

Being the case of a dependent variable, noted  $y$ , and an independent variable, noted  $x$ .

The relation between  $y$  and  $x$  is given by  $y = f(x)$  (2.1)

where  $f(x)$  is a varied function of  $x$ .

If, in the dependency given by (2.1), we presume the function  $f(x)$  is linear in  $x$ , which is to say,

$$f(x) = \alpha + \beta x \quad (2.2), \quad \text{with} \quad \alpha, \beta$$

parameters, and we also presume that this relation is stochastic, which is to say

$y = f(x) + \varepsilon$  (2.3), where  $\varepsilon$  is called a significance (specification) error and has a known probable distribution (is a random variable).

Relation (2.3) has two components:

- the first,  $\alpha + \beta x$  is the deterministic component of the dependent variable  $y$  with  $\alpha$  and  $\beta$  representing regression coefficients or regression parameters which we estimate based on  $y$  and  $x$  values;
- the second,  $\varepsilon$ , is the stochastic or random element

The error term (stochastic or random component) from a stochastic equation (see relation (2.3)) represents the effect of all omitted variables from the model, but which collectively affect the dependent variable  $y$ .

b) if  $m > 1$ , we have more than one independent variable  $x$  and therefore, what is called a multiple (multivariate) regression.

As a consequence, the model's form is given by:

$$y = f(x_1, x_2, \dots, x_m) \quad (2.4)$$

where

$$f(x) = \alpha + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_m x_m \quad (2.5)$$

in the case of the linear multiple regression, with  $\alpha, \beta_1, \beta_2, \dots, \beta_m$  as its parameters, and we assume that such a relation is stochastic  $y = f(x_1, x_2, \dots, x_m) + \varepsilon$  (2.6)

or corresponding to the linear multiple regression and in analytic writing

$$y_i = \alpha + \beta_1 x_{1i} + \dots + \beta_m x_{mi} + \varepsilon_i \quad i = \overline{1, n} \quad (2.7)$$

where  $\varepsilon_i$  is called a significance (specification) error and has a known probable distribution (is a random variable), and  $n$  is the number of observations.

The random variable  $\varepsilon_i$  measures errors in the random explained variable  $y$  and errors from the significant relation between  $y$  and its random explicative variables  $x_1, x_2, \dots, x_m$ .

<sup>4</sup> the term of regression was invented by Sir Francis Galton (1822-1911) from England, who studied the link between height of children and the height of parents, noting that, despite the fact that tall parents had children tall and short parents had short children, there was an ascent trend of children by the media. There is therefore a *regression of height of children by the media*. Galton, in his aristocratic style defined this *regression to mediocrity*.

Besides these, regression analysis uses the logistic regression model, part of the non-linear models.

By modeling financial crises at a company level, we will give the dependent variable the value of 1 for when the company is in financial crisis and 0 for when operation is normal.

With  $P$  as the probability for certain events to be successful, as subject of the impact of the  $x$  factor:

$$P = \frac{e^{y(x)}}{1 + e^{y(x)}} \quad (2.8)$$

$$\text{with } y(x) = \alpha + \beta_1 x_1 + \dots + \beta_m x_m \quad (2.9)$$

from which we may draw the conclusion that

$$1 - P = \frac{1}{1 + e^{y(x)}} \quad (2.10)$$

By dividing relations (2.8) and (2.10) we

$$\text{get } \frac{P}{1 - P} = e^{y(x)} \quad (2.11)$$

Logarithm of relation (2.11) is

$$\ln \frac{P}{1 - P} = y(x) = \alpha + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_m x_m$$

where:

- $y(x) = 1$ , for when the company is in financial crisis;
- $y(x) = 0$ , for when the company is operating normally.

### 3. ROLE OF THE BASEL II ACCORD IN STIMULATING RISK MANAGEMENT DURING THE FINANCIAL CRISIS

The Basel II Accord forced banks and other authorized financial institutions so communicate at the beginning of each day the daily estimated risk to its closest monetary authority, using for this one or more of the VaR (Value-at-Risk) measuring models.

Estimating VaR and daily capital modifications ( $\Delta K$ )

The Basel II Accord decided the following:

- Value-at-Risk on day  $t$  is given by

$$VaR_t = \hat{Q}_t - \alpha_t \cdot \hat{\sigma}_t$$

- the daily capital modification  $\Delta K$  is

$$\text{given by } \Delta K_t = \max \{-VaR_{t-1}; -(3 + k)VaR_{60}\}$$

where:

- $VaR_{t-1}$  - Value-at-Risk on day  $t$ ;

- $\hat{Q}_t$  is the estimate revenue for day  $t$ ;
- $\alpha_t$  is the critical value of a percentage point of estimate revenue on day  $t$ ;
- $\hat{\sigma}_t$  estimated risk (square root of volatility) on day  $t$ ;
- $\Delta K_t$  capital modification on day  $t$  compared to day  $t-1$ ;
- $k$  is the value of the penalty for violating the Basel II Accord, with  $k \in [0,1]$ .

Zone	Number of violations of the Basel II	The amount of the penalty for violation of the Basel II ( $k$ )
Green	0 to 4	0,00
Yellow	5	0,40
	6	0,50
	7	0,65
	8	0,75
	9	0,85
Red	10 and over	1

**Table1.** Areas of penalty under Basel II Agreement

As a result, the daily capital modification that must be established at the highest level of VaR of the precedent day or at the VaR average of the last 60 days, multiplied by the penalty factor  $3+k$ .

### 4. PRUDENTIAL REGULATION AT A MACROECONOMIC SCALE. MEASURES TO ALLEVIATE THE CURRENT FINANCIAL CRISIS

The Basel II set of regulations is based on the most accommodating measure of risk, which is the Value-at-Risk (VaR), which expresses only individual banks' risk.

A measurement of risk which focuses on a financial institution's contribution to systematic risk is CoVAR.

CoVar<sup>5</sup> at an institution level is defined as the financial sector's VaR, conditioned by the institution's entry in the situation's alleviation process. The percentage difference between VaR and CoVAR signifies the degree by

<sup>5</sup> Brunnermeier M.K., *Financial Crises: Mechanisms, Prevention, and Management*, [http://fmng.lse.ac.uk/upload\\_file/1197\\_BrunnermeierPaper.pdf](http://fmng.lse.ac.uk/upload_file/1197_BrunnermeierPaper.pdf)



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which a private institution contributes to the financial system's risk.

The greater a financial institution's contribution to systematic financial risk, the greater the demand for funds, the Pigovian tax<sup>6</sup>, or the compulsory insurance premium.

Measures of alleviation of the current financial crisis

Of the measures that can be adopted for leaving the current financial crisis, we can enumerate:

- regulating liquidity in the financial system;
- anti-cyclical measures;
- amortizing swap;
- debt buyback at market price by the state;
- nationalization and prompt corrective action;
- partial nationalization and public fund injection;
  - state-bought toxic actives;
  - adjusting housing prices by mortgage subventions – other than introducing refinancing schemes to minimize the number of lost houses, the government can try to lower mortgage rates and thus make housing cost bigger. This can be done with the support of the Central Bank by its direct purchase of long term mortgages or accepting them as collateral for uncertain loans;
- crisis management – necessitates a certain form of recapitalization or restructuring of the banking system through the government. Recapitalization of a limited sector like the banking sector can be done either on debtors' money and/or tax payer money.

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<sup>6</sup> it increases with increasing of CoVAR in the bank and with other measures of systemic risk.

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