THE ROLE OF DERIVATIVE INSTRUMENTS IN FINANCIAL STABILITY

LELA SCHOLER-IORDANASHVILI

PhD student,

Grigol Robakidze University, Georgia

L.Iordanishvili@gruni.edu.ge

INTRODUCTION

Development of derivatives market for a long time remained subject of interests among researchers, policy makers and financial agencies, it has a vital role in financial system and makes greatest contribution in various aspects of economy as a whole. Lien and Zhang summarize role and functions of derivative market and functions in developing economies, in theoretic and empirical researches (Lien, Donald, and Mei Zhang. 2008. A survey of emerging derivatives markts. Emerging Markets Finance and Trade 44: 39–69).

First, derivatives market offers effective mechanism which simplifies sharing of prices risk toward commodity in the market and thus helping producers to deal with variability of prices. And also it plays basic role in correct hedging and risk management by supporting capital flow in the market of countries, but it negatively affects financial systems by introduction of more unforeseen crisis dynamics and is the mechanism for activation of chain reaction. Second, it is widely accepted that function of derivatives market is method of reduction and redistribution of risk, means for discovery of price and stabilizer of price. Derivatives markets supposedly increase information flows in the market. Information about future prices supposedly reflects future demand too, and thus influences over solutions of production and storage and subsequently reduces variability of spot-price. Except of discovery of derivatives market functions on hedging and risk management and also discovery of prices in spot-market they reveal such issues which concern structure and efficiency of the market, as well as measurement of risk and prices (Atilgan, Yigit, K. Ozgur Demirtas, and Koray D. Simsek. 2016. Derivative markets in emerging economies: A survey. International Review of Economics and Finance 42: 88–102. [CrossRef]).

LITERATURE REVIEW

It is very important to review mechanisms of derivatives use in financial crisis and wider, mechanism of use of derivatives instruments in economy. In relation to it Dodd notes that derivatives play "dual role" in economy from which one provides economically useful role in "hedging and risks management" and allows capital flows in developing countries which are not of sufficient volume for development, and also "in establishment of standard market prices and discovery of prices", thus they reduce uncertainty and improve efficiency and stability of the market (Dodd R Derivatives, the shape of international capital flows and virtues of prudential regulation [Journal] // United Nations University Discussion paper. – 2002).

From the other hand, derivatives can be used for economically harmful purposes during existence of "badly structurized and improperly regulated derivatives market" under conditions of full and rapid financial liberalization of crisis economy in 1990th (Dodd. R Consequences of Liberalising Derivatives Markets [Conference] // Financial Policy Forum Derivatives Study Centre. – 2003).

Dodd classifies purposes of economically harmful use of derivatives as "misuse of derivatives", which can be noted as a threat for integrity and efficiency of financial market, and therefore for the whole economy" and "incorrect use of derivatives", which can be noted as "variability of dissolution and crisis". Dodd sees the role of derivatives in creation of crisis under conditions of speculation. He notes that after gaining of profitable position during possible reduction of currency value in derivatives market, attack on fixed or variable exchange rate indicates on creation of crisis itself. It summarizes the mechanism in following way:

Majority of hedge-funds, or, to say widely, of speculants occupies position opposing to local currency (for example, Thai Baht, case of south-west Asia) on forward market, as short positions, they sell currency, what means massive outflow of capital in developing countries because of synthetic forwards or swaps of local banks, for compensation of risks associacted to foreign currency. Under conditions of negative outcomes of incorrect use of derivatives, which are planned

or unplanned efforts, Dodd highlights "leverage, non-liquidity, crisis accelerating factors and infection channels". He also added speculative factor as creator of crisis, although he reviews it as a factor of indirect influence.

Thus fixed or manageable currency regimens can appear to be less stable because of derivatives and outcome of devaluation is unavoidable, which can be created by speculative attack, or affect of devaluation can deepen because of them. Therefore, there is "systemic risk" in financial markets and they increase tendency of spreading of crisis among countries. After acute stage of crisis policy aimed to economical improvement can appear ineffective because of them (Dodd. R. The role of derivatives in the east asian financial crisis [Conference] // International capital markets and the future of economic policy. – 2000).

THE EMPIRICAL ANALYSIS

For empirical testing database containing 5 countries: Brazil, Singapore, Russia, Argentina, USA are used for period of 1997-2010, via analysis of this database we will study potential role of derivatives for countries with emerging and developed markets in global financial crisis of 1998 and 2008. From this standpoint, in form of methodology analysis of database is conducted as follows: time-series regression used for data analysis which can be indicated in following form:

$$Y_{it} = a + X_{it}B + \mu_{it}$$

Where i means family economy, individuals, firms, countries etc., and t means time within which variables are being observed.

Empirical model was constructed for following countries: USA, Russia, Brazil, Singapore, Argentina. For each country influence of derivatives on financial stability was estimated via below mentioned regression equation. Results of analysis are shown in form of table. Regression equation below is empirical model via which influence of derivatives over financial stability was studied.

$$CI_{it} = C + \beta_1 CPS_t + \beta_2 CAGDP_t + \beta_3 CRGDP_t +$$

$$+ \beta_3 CRGDP_t + \beta_4 CD_t + \beta_5 TDFR_t + \omega_t$$

DEPENDENT VARIABLE

CI (crisis index): which can be also called "financial impact index" or "crisis pressure index" or "Exchange Market Pressure Index" what means that if it increases, the ability of crisis will be increased too, particularly, impact of crisis will be increased. According to the works existed in applied literature it is calculated as follows:

CI= %ΔS − α1%ΔR
%ΔS: Quarterly percentage change of the exchange rate, defined in the domestic currency per unit of the

Expected Sign	Symbols	Description	Unit, scale
+	CI	Crisis index	Index
+	CPS	CLAIMS ON PRIVATE SECTOR (NONPERFORMING LOANS)	In national currency, in millions
	CA	Current account	In USD
	CR	Credit to private sector	In national currency, in millions
	TD	Total outstanding amounts of the exchange traded derivatives.	In USD
	GDP	Gross domestic product	In national currency, in millions
	FR	Foreign reserves minus gold	In USD
+	CPSGDP	The ratio of the non-performing loans to GDP Correlation of unpaid loans to GDP	Rate
-	CAGDP	The ratio of the current account to GDP	Rate
+	CRGDP	The ratio of the domestic credits on private sector to GDP.	Rate
+	TDFR	The ratio of the total outstanding amounts of the exchange traded derivatives to foreign exchange reserves.	Rate

US Dollar.
%ΔR: Quarterly percentage change of the foreign exchange reserves
α1 = σs/ σr
σs: The fixed standard deviation of the percentage change of the exchange rate;
σr: The fixed standard deviation of the percentage change of the foreign exchange reserves.

In this paper Crisis Index is calculated as the weighted average of percent changes in the bilateral nominal exchange rate and the percent change in foreign reserves, with weights such that the two components of the index have equal sample volatility. Therefore, change in exchange rate have positive signs, and changes in monetary reserve have negative signs, devaluation of exchange rate and reduction of monetary reserve increases impact of crisis. From this part it can be said that increase of crisis index means increase of weighted difference between reduction of exchange rate percentage and reduced percentage of monetary reserves. Weighting here is achieved by multiplication of the changes in reserves by α1 coefficient. Therefore, definition of crisis, used as calculated here basis of crisis index, becomes as „episode in which attack to currency causes sharp reduction of currency, strong reduction of international reserves or combination of both effects"(Edison, H. J., 2000. Do Indicators of Financial Crises Work? An Evaluation of An Early Warning System. International Finance Discussion Papers. No. 675, Board of Governors of the Federal Reserve System).

INDEPENDENT EXPONENT VARIABLES

CPSGDP - (The Ratio of the Non-performing loans to GDP): means that where the liquidity is increased by foreign capital inflows, this excessive liquidity is spread into the private sector by banks through bank credits. In this regard, in such conditions when the loans increase, the banks act in a relaxed manner, hence, the criteria of the banks for examining loan applications get relatively loose leading to "bad bank loans" and as a result, nonperforming ones (Akiba, Jia, 2007. Reassessment of Currency Index by Fundamentals. Annals of Economics and Finance. 1, 57-85).

So, the expected sign of this variable is positive pointing out the positive relationship with the Crisis Pressure Index (Corsetti, Pesenti, Roubini, 1999. Fundamental Determinants of the Asian Crisis: The Role of Financial Fragility and External Imbalances. NBER Tenth Annual East Asia Seminar).

CAGDP (The Ratio of the Current Account to GDP): while CAD, which is negative sign of current account, can increase impact over devaluation of currency, it is general determinant used in empirical studies. Other case is excess of current account which indicates that current account has positive sign. From this part, the rate of current account toward GDP here is used as one of the possible determinants/ reasons of financial crisis. It is expected that this variable (CAGDP) has negative relation to crisis impact index.

CRGDP (The Ratio of the Domestic Credits on Private Sector to GDP): this variable is estimated as "loans boom" variable which indicates that current banking system does not have solid/ healthy structure which is also estimated as determinant of financial weakness, while causes negative expectations and reduction of investors trust toward banks and system as a whole, what finally ends with self-realizeable crisis, namely, weak banking system increases ability of speculative attack (Kruger, Osakwe, Page, 2000. Fundamentals, Contagion and Currency Crisis: An Empirical Analysis. Development Policy Review. 18, 257-274). From this part, given indicator which can be also used in the literature as positive index of financial liberalization/ development indicates on potential inter-relations between weak banking system and account crisis. Expected sign of this variable is positive while it indicates on positive relation toward crisis impact index.

TDFR (The Ratio of the Total Notional Amounts Outstanding of the Exchange Traded Derivatives to Foreign Exchange Reserves): high value of this rate is one of the possible determinants of financial crisis of emerging markets. This happens because of fully liberalized, badly structured and improperly regulated derivatives market, derivatives can be highly open to use for economically harmful purposes. This purpose can be the following: manipulation, high risky positions presented by high leverages, incorrect information, reduction of transparency, avoidance of reasonable regulations etc, what is weak point for the crisis. Even more, incorrect use of derivatives, such as creation of non-liquidity, is contagious channel for crisis and distorts balance statements of firms and conditions financial fragility which causes sensitivity of financial sector and crisis by threatening to integrity and efficiency of financial market. All of the mentioned causes negative expectations and loss of investors' trust toward the whole system, increases impact over fragile currency (Garber, Lall, 1996. Derivative Products in Exchange Rate Crises. In Glick, Managing Capital Flows and Exchange Rates: Lessons from the Pacific Basin (pp. 206-231). Cambridge: Cambridge University Press. Garber, 1998. Derivatives in International Capital Flow, NBER Working Paper Series No: 6623. Rothig, A. 2004. Currency Futures and Currency Crises. Darmstadt Discussion Papers in Economics, no.136).

Results of regressive equation for USA
(Depended variable is currency crisis)

Table 2

Source	SS	df	MS	Number of obs = 44
				F(4, 39) = 27454,00
Model	283.378961	4,00	70.8447404	Prob > F = 0.0113
Residual	736.886224	39,00	18.8945186	R-squared = 0.2778
				Adj R-squared = 0.2037
Total	1020.26519	43,00	23.7270973	Root MSE = 4,34
CI	Coef.	Std. Err.	t	P>t
CAGDP	-1.460019	2.944714	-0.50	0.623
TDFR	4.272674	1.378228	3,10	0.004
CRGDP	-1.510498	.4559265	-3.31	0.002
DSR	-2.842022	1.288604	-2.21	0.033
_cons	112.8102	35.6376	3,17	0.003

The second table shows the impact of derivatives in the USA over financial stability. As it is seen from the table, currency crisis is taken as depended variable, which is calculated by the formula mentioned in the research methodology. And independent variables are the ratio of the non- performing loans to GDP, the ratio of the current account to GDP, the ratio of the domestic credits on private sector to GDP, the ratio of the total notional amounts outstanding of the exchange Traded Derivatives to Foreign Exchange Reserves. As table shows, following variables TDFR, CRGDP, DSR are statistically significant. Among these variables CRGDP, DSR negatively affects the financial stability of the USA, particularly, currency crisis, and influence of derivatives over financial stability is positive. Given variable CAGDP, despite of its negative influence over currency crisis, has not statistically significant impact. Besides, the coefficient of determination is R-square = 0,3 what means that explanatory variables explain dependent variable by 30 percent.

Now let's the example example of Singapore (see table 3), particularly, the influence of derivatives over financial stability of Singapore. The table shows that in case of Singapore, influence of derivatives over financial stability is positive and at the same time statistically significant.

Results of regressive equation for Singapore
(Dependent variable is currency crisis)

Table 3

Source	SS	df	MS	Number of obs =55
				F(4, 50) = 6.00
Model	236.25413	4,00	59.0635325	Prob > F =0.0005
Residual	492.53639	50,00	9.8507278	R-squared = 0.3242
				Adj R-squared = 0.2701
Total	728.79052	54,00	13.4961207	Root MSE = 3.1386
CI	Coef.	Std. Err.	t	P>t
TDFR	.800956	.3987811	2,01	0.050
CAGDP	-.4888512	.1224652	-3.99	0.000
CRGDP	.0234191	.0399003	0.59	0.560
CPSGDP	.0362271	1.716502	0.02	0.983
_cons	-.4627479	7.620189	-0.06	0.952

What about the rest variables, particularly, CAGDP- it has negative influence over financial stability and at the same time is statistically significant, and CRGDP, CPSGDP is positively related to financial stability, and degree of their statistical significant is low.

Results of regressive equation Brazil
(Depended variable is currency crisis)

Table 4

Source	SS	df	MS	Number of obs = 55
				F(4, 50) = 2,97
Model	.317056516	4,00	.079264129	Prob > F = 0,0282
Residual	1.33555678	50,00	.026711136	R-squared = 0,19
				Adj R-squared = 0,12
Total	1.6526133	54,00	.03060395	Root MSE = 0,16
CI	Coef.	Std. Err.	t	P>t
CAGDP	-.0087071	.0255751	-0.34	0.735
TDFR	-.4650818	.1933797	-2.41	0.020
CRGDP	-.0025758	.0034681	-0.74	0.461
CPSGDP	.0192595	.0525028	0.37	0.715
_cons	.3727575	.1878262	1,98	0.053

And now let's review the example of Brazil (see table 4) which gives us very interesting picture of derivatives. Particularly, from the table 4 it is obvious that derivatives are negatively related to financial stability and this variable is statistically significant. CAGDP and CRGDP are negatively related to financial stability, although these variables are not statistically significant. What about variable CPSGDP, despite of the fact that it positively relates to financial stability, this variable is not also statistically significant.

Results of regressive equation Russia
(Depended variable is currency crisis)

Table 5

Source	SS	df	MS	Number of obs =44
				F(8, 31) = 15766,00
Model	2399.05898	8,00	299.882373	Prob > F =0.0062
Residual	2714.11678	31,00	87.5521541	R-squared = 0.4692
				Adj R-squared = 0.3322
Total	5113.17576	39,00	131.107071	Root MSE = 9,36
CI	Coef.	Std. Err.	t	P>t
CAGDP				
--.	-21.14026	15.75612	-1.34	0.189
L4.	37.79076	14.64345	2,58	0.015
TDFR				
--.	-28.78385	11.76226	-2.45	0.020
L4.	23.12101	9.58498	2,41	0.022
CRGDP				
--.	-1.002122	.7747395	-1.29	0.205
L4.	1.377483	.8068871	1,71	0.098
DSR				
--.	1.536312	.6188175	2,48	0.019
L4.	.3872123	.6095537	0.64	0.530
_cons	-27.60569	16.41353	-1.68	0.103

Table 5 shows the example of Russia. The table shows that derivatives negatively influence over financial stability. They also negatively influence over CAGDP and CRGDP financial stability. Although their influence is not statistically significant.

Results of regressive equation Argentina
(Depended variable is currency crisis)

Table 6

Source	SS	df	MS	Number of obs =55
				F(4, 50) = 2,95
Model	2466.48033	4,00	616.620083	Prob > F = 0,0290
Residual	10459.0012	50,00	209.180023	R-squared =0,1908
				Adj R-squared = 0,1261
Total	12925.4815	54,00	239.360768	Root MSE = 14,463
CI	Coef.	Std. Err.	t	P>t
CAGDP	2,85	1.929844	1,48	0.145
TDFR	-6.174462	3.299214	-1.87	0.067
CRGDP	.0054612	2.386662	0.00	0.998
CPSGDP	201.2427	182.6504	1,10	0.276
_cons	-23.34083	11.54553	-2.02	0.049

In the table 6 there is given the influence of derivatives over financial stability on the example of Argentina. Table shows that derivatives negatively influence over financial stability. And also this influence is statistically significant. CAG-DP, CRGDP and CPSGDP positively influence over financial stability, although their influence is not statistically significant.

CONCLUSION

Therefore, we have studied the influence of derivatives in the research as on the example of developed, so of developing countries. Research was based on empirical testing. Empirical testing was realized via OLS regression. As research shows us derivatives have as positive so negative influence; although their influence depends on existence of correct financial system. Particularly research showed us that in the USA and Singapore derivatives have positive influence, when in Brazil, Russia and Argentina their influence is negative. This confirm spread in scientific literature opinion that derivatives can be used for economically harmful purposes during existence of "badly structured and improperly regulated derivatives market", under conditions of correct financial liberalization.

REFERENCES:

1. Akiba, H. and Jia, Y., (2007). Reassessment of Currency Index by Fundamentals. Annals of Economics and Finance. 1, 57-85.
2. Atilgan, Yigit, K. Ozgur Demirtas, and Koray D. Simsek. (2016). Derivative markets in emerging economies: A survey. International Review of Economics and Finance 42: 88–102. [CrossRef]
3. Corsetti, G., Pesenti, P. and Roubini, N., (1999). Fundamental Determinants of the Asian Crisis: The Role of Financial Fragility and External Imbalances. NBER Tenth Annual East Asia Seminar.
4. Dodd R Derivatives, the shape of international capital flows and virtues of prudential regulation [Journal] // United Nations University Discussion paper. - 2002.
5. Dodd. R Consequences of Liberalising Derivatives Markets [Conference] // Financial Policy Forum Derivatives Study Centre. - 2003.
6. Dodd. R. The role of derivatives in the east asian financial crisis [Conference] // International capital markets and the future of economic policy. - 2000.
7. Edison, H. J., (2000). Do Indicators of Financial Crises Work? An Evaluation of An Early Warning System. International Finance Discussion Papers. No. 675, Board of Governors of the Federal Reserve System.
8. Garber, P. M. (1998). Derivatives in International Capital Flow, NBER Working Paper Series No: 6623
9. Garber, P. M. and Lall, S. (1996). Derivative Products in Exchange Rate Crises. In Glick R. (eds), Managing Capital Flows and Exchange Rates: Lessons from the Pacific Basin (pp. 206-231). Cambridge: Cambridge University Press.
10. Kruger, M., Osakwe, P. and Page, J., (2000). Fundamentals, Contagion and Currency Crisis: An Empirical Analysis. Development Policy Review. 18, 257-274.
11. Lien, Donald, and Mei Zhang. 2008. A survey of emerging derivatives markets. Emerging Markets Finance and Trade 44: 39–69.
12. Rothig, A. (2004). Currency Futures and Currency Crises. Darmstadt Discussion Papers in Economics, no.136.

THE ROLE OF DERIVATIVE INSTRUMENTS IN FINANCIAL STABILITY

LELA SCHOLER-IORDANASHVILI

PhD student,

Grigol Robakidze University, Georgia

L.Iordanishvili@gruni.edu.ge

SUMMARY

Globalization offers new challenges to the world economy, which becomes more depended on unprecedented increase of financial activity worldwide. Availability of information and development of technologies significantly increased capital flow in the world and role of capital and monetary markets in economy.

Second half of 2007 and first half of 2008 faced important events in the world economy. Among them especially notable are US real estate crisis and global limitation of credits, devaluation of USD and strengthening of inflation processes. These global events have significant influence over financial stability.

In the recent decade variability of stocks and interest rates, together with globalization of capital markets, increased demand on financial instruments with the purpose of distribution of risks. From this perspective, interest rate derivatives are most frequently marketed among OCT derivatives.

Therefore, estimation of the role of financial derivatives instruments is very important in stability of international financial system. Purpose of research is to analyze influence of derivatives over financial crisis. Within frameworks of research 5 countries are studied for 1997-2010 quarterly. OLS regressive equation is used in research for empirical tests. Model includes following variables: crisis index (dependent variable), independent variables are: correlation rate of current account and GDP, correlation rate of domestic credit on private sector with GDP, correlation rate between foreign currency reserves and conditional amounts of market derivatives on the stock exchange. Empirical analysis shows us that influence of derivatives over financial stability is not unilateral and depends on characteristics of financial system of the country. Particularly, in Singapore and USA, where financial system is strong, influence of derivatives is positively reflected on financial stability, and empirical study conducted on example of emerging markets, particularly, Argentina, Russia and Brazil revealed negative influence of derivatives on financial system.