A LOOK AT THE IMPLICATIONS OF REGULATORY REFORMS FOR OTC DERIVATIVES MARKETS

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ABSTRACT

In September 2009, the G20 leaders made a commitment to regulate the OTC (over-the-counter) derivatives market to enhance transparency and reduce risk. Within the European Union, these objectives have been implemented through the European Market Infrastructure Regulation (EMIR) and the revised Markets in Financial Instruments Directive (MiFID II). EMIR entered into force on 16 August 2012. Although EMIR is already in force, some of the definitions in EMIR cross refer to definitions under MiFID so the ongoing changes in MiFID II have a significant impact on derivatives. Most of the provisions in MiFID II were intended to become effective on 3 January, 2017. However, the European Commission has proposed that MiFID II should be delayed by up to a year (that is, until 3 January, 2018). Reforms in the U.S. were being carried out under the Dodd-Frank Wall Street Reforms and Consumer Protection Act (Dodd-Frank Act) and on July 21, 2010, the Dodd-Frank Act was signed into law by President Obama. Regulatory reforms have already had an impact on OTC derivatives market structures and volumes. In this paper we take a look at the current state of the OTC derivatives market reforms and analyse their potential impact. In particular, we focus on the trends in market volumes -gross market value of OTC derivatives contracts - before and after regulatory reforms were introduced and also on their correlations with GDP growth rates, EUR/USD exchange rates and trade compression.

Keywords: *Hypothesis testing, OTC derivatives, OTC market changes, regulatory reforms*

1. INTRODUCTION

In the wake of the financial crisis 2007-2009, derivatives markets have been amongst those markets receiving heightened regulatory attention in spite of the fact that derivatives markets per se were not amongst the causes of the financial crisis. More specifically, regulators and policy makers have criticised the alleged opaqueness and complexity of over-the-counter (OTC) derivatives markets as being potential sources of heightened volatility and systemic risks. This clearly stands in contrast to the view, that derivatives are useful to manage risks in the financial system and in the real economy alike.

There was a lack of transparency about the size of bilateral positions in OTC derivatives contracts. The combination of opacity and concerns over the adequacy of collateral, and counterparty risk management arrangements more generally, created an environment in which confidence could be lost very quickly. Arguably of most concern at, and since, the time of the financial crisis has been the interlinkages between the major counterparties participating in the OTC derivatives market (Ruffini and Steigerwald, 2014). As the major counterparties are

international financial institutions, there is therefore the risk that should one counterparty default on its obligations in the OTC derivatives market, then this will have a domino effect. This ultimately contributed to significant market disruption in the aftermath of the collapse of Lehman Brothers and the near-collapse of American Insurance Group in September 2008, both of whom were major participants in OTC derivatives markets.

In response to the financial crisis (Morgan, 2012), regulators worldwide initiated various OTC derivatives reforms (Deutsche Bank, 2013) and a number of rules and detailed implementation standards have been formulated under different national regulations. The Dodd-Frank Act (DFA) in the U.S., the European Market Infrastructure Regulation (EMIR) in the European Union, and similar regulations in other G20 jurisdictions (Hamunen, 2015) aim to bring about greater transparency and enhanced risk management measures in the OTC derivatives markets. These regulations focus on the implementation of centralized clearing services, collection and dissemination of trade data, trade execution through organized platforms and stipulate for prudent business standards and risk management practices for OTC market participants (Jones Day, 2013). Though the overall impact of the DFA and EMIR is wide ranged (OECD, 2011), for this paper, we have limited the scope to deal with the impact they could have on the volumes of the OTC derivatives markets and on the correlation with some of the most important economic factors.

2. METHODOLOGY

In this paper, we formulate the problem – consequences of the new regulatory landscape on OTC derivatives trading - in a hypothesis testing framework using IBM SPSS Statistics which is a software for managing data and calculating a wide variety of statistics by means of ad-hoc analysis, hypothesis testing, and predictive analytics. The intent of hypothesis testing is formally examining two opposing conjectures (hypotheses). These two hypotheses are mutually exclusive and exhaustive so that one is true to the exclusion of the other. We accumulate evidence – collect and analyze sample information – for the purpose of determining which of the two hypotheses is true and which of the two hypotheses is false.

A crucial feature of hypothesis testing is that the two competing hypotheses are not treated in the same way: one is given the benefit of the doubt, the other has the burden of proof. The one that gets the benefit of the doubt is called the null hypothesis and is denoted H_0. The other is called the alternative hypothesis and is denoted H_1. By definition, the default is the null H_0. When we carry out a test, we are asking whether the available data is significant evidence in favor of the alternative H_1. We are not testing whether H_1 is true; rather, we are testing whether the evidence supporting H_1 is statistically significant.

The conclusion of a hypothesis test is that we either reject the null hypothesis (and accept the alternative) or we fail to reject the null hypothesis. Failing to reject the null hypothesis does not quite mean that the evidence supports H_0; rather, it means that the evidence does not strongly favor the alternative H_1. Again, H_0 gets the benefit of the doubt.

SPSS calculates the t-statistic and its p-value (confidence value) under the assumption that the sample comes from an approximately normal distribution. If the p-value associated with the t-test is small (0.05 is often used as the threshold), there is evidence that the mean is different from the hypothesized value. If the p-value associated with the t-test is not small ($p > 0.05$), then the null hypothesis is not rejected.

An independent one-sample Levene's t-test (it is an inferential statistic used to assess the equality of variances for a variable calculated for two or more groups) was used to test whether the growth rate of gross market value of OTC derivatives contracts (the cost of replacing all

outstanding contracts at current market prices) is different or not before and after the regulatory reforms (hypothesis 1). The research question and problem do not have to consist of one hypothesis only, because this growth rate could be, of cause, affected by different additional factors, like, e.g., GDP growth rate, EUR/USD exchange rate and portfolio compression.

Therefore, the next logical step was to verify whether the growth rate of gross market value of OTC derivatives contracts is positively correlated with the growth rate of notional amounts outstanding of OTC derivatives contracts (hypothesis 2). Next, also the correlation between the growth rate of gross market value of OTC derivatives contracts and the GDP growth rate (hypothesis 3) and the correlation between the growth rate of gross market value of OTC derivatives contracts with the EUR/USD exchange rate (hypothesis 4) was tested. Also of interest was the question, whether the growth rate of gross market value of OTC derivatives contracts is correlated with the portfolio compression (hypothesis 5). As statistical data sources we have used databases and reports of Bank for International Settlements (BIS), European Central Bank (ECB), International Swaps and Derivatives Association (ISDA), as well as some published studies (ISDA, 2016) relevant for our research.

3. MAIN RESULTS

Activity in global OTC derivatives markets fell in the first half of 2015. The notional amount of outstanding contracts declined from USD 629 trillion at end-December 2014 to USD 553 trillion at end-June 2015. Even after adjustment for the effect of exchange rate movements on positions denominated in currencies other than the USD, notional amounts were still down by about 10%. Trade compression to eliminate redundant contracts was the major driver of the decline.

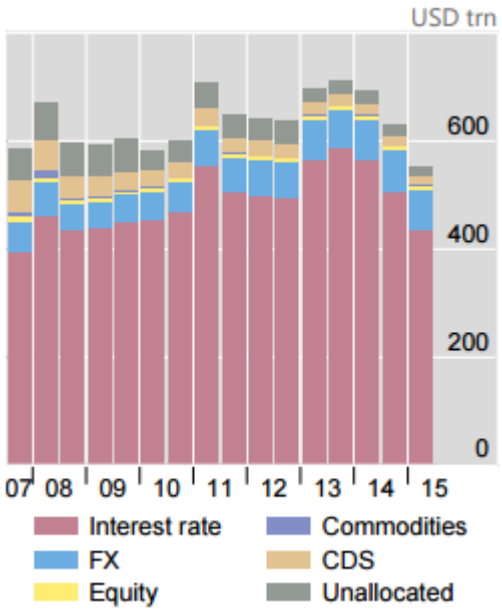

Figure 1: Notional principal (BIS)

The gross market value of outstanding derivatives contracts – which provides a more meaningful measure of amounts at risk than notional amounts – declined even more sharply in the first half of 2015. Market values decreased from USD 20.9 trillion to USD 15.5 trillion between end-December 2014 and end-June 2015. The fall is likely to have been driven by the reduction in notional amounts outstanding as well as increases in long-term interest rates, which took yields back closer to those on outstanding swaps.

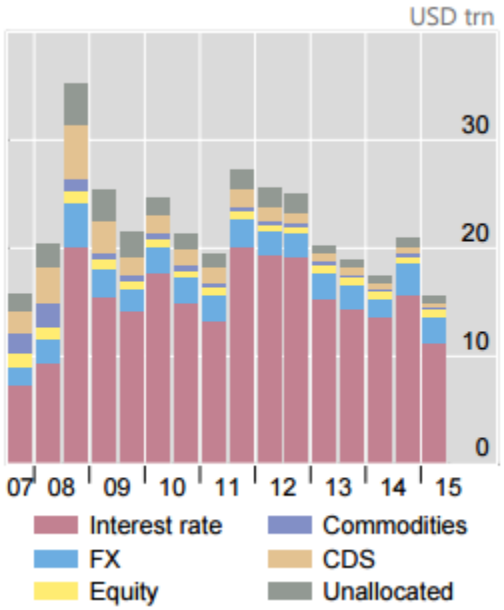

Figure 2: Gross market value (BIS)

In this paper, we use a statistical hypothesis testing procedure using the IBM SPSS statistical package. SPSS Statistics can take data from almost any type of file and use them to generate tabulated reports, charts, and plots of distribution and trends, descriptive statistics, and complex statistical analyses.

Hypothesis H1: The growth rate of gross market value of OTC derivatives contracts is different before and after regulatory reforms.
Hypothesis H1$_0$: The growth rate of gross market value of OTC derivatives contracts is not different before and after regulatory reforms.

Table 1: T- test hypothesis H1 (time interval 1H 1998 – 1H 2009 vs. 2H 2010 – 1H 2015) (own calculations)

Group Statistics

	Regulation	N	Mean	Std. Deviation	Std. Error Mean
GCE growth	0	22	6,7304%	17,54507%	3,74062%
	1	10	-1,0936%	16,12473%	5,09909%

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
GCE growth	Equal variances assumed	,420	,522	1,197	30	,240	7,82399%	6,53364%	-5,51948%	21,16745%
	Equal variances not assumed			1,237	18,942	,231	7,82399%	6,32400%	-5,41503%	21,06300%

The H1$_0$ is not rejected because the p-value, listed in the column called "Sig. (2-tailed)", is greater (p = 0.240) than the critical p-value of 0.05. Hence, we conclude that the growth rate of gross market value of OTC derivatives contracts is not different before and after regulatory reforms.

Hypothesis H2: The growth rate of gross market value of OTC derivatives contracts is positively correlated with the growth rate of notional amounts outstanding of OTC derivatives contracts.
Hypothesis $H2_0$: The growth rate of gross market value of OTC derivatives contracts is not positively correlated with the growth rate of notional amounts outstanding of OTC derivatives contracts.

Table 2: Correlation matrix - hypothesis H2 (own calculations)

		GCE growth	Nominal Value
GCE growth	Pearson Correlation	1	,204
	Sig. (2-tailed)		,247
	N	34	34
Nominal Value	Pearson Correlation	,204	1
	Sig. (2-tailed)	,247	
	N	34	34

Correlation matrix (Table 2) tells us that the correlation coefficient between the gross market value of OTC derivatives contracts and the growth rate of notional amounts outstanding of OTC derivatives contracts is positive (r = 0.204), but not statistically significant; therefore, the hypothesis $H2_0$ is valid.

Hypothesis H3: The growth rate of gross market value of OTC derivatives contracts is positively correlated with the GDP growth rate.
Hypothesis $H3_0$: The growth rate of gross market value of OTC derivatives contracts is not positively correlated with the GDP growth rate.

From the first column of the correlation matrix (Table 3), that shows the correlation coefficients between the growth rate of gross market value of OTC derivatives contracts and the GDP growth rates of the U.S., EU countries, G20 and OECD countries, one can conclude, that these correlations are not statistically significant; therefore we fail to reject the null hypothesis $H3_0$.

Table 3: Correlation matrix – hypothesis H3 (own calculations)

		GCE growth	United States	Euro area (19 countries)	European Union (28 countries)	G20	OECD - Total
GCE growth	Pearson Correlation	1	-,111	,091	,095	,059	,001
	Sig. (2-tailed)		,534	,611	,593	,744	,996
	N	34	34	34	34	33	34
United States	Pearson Correlation	-,111	1	,775**	,813**	,830**	,929**
	Sig. (2-tailed)	,534		,000	,000	,000	,000
	N	34	35	35	35	33	35
Euro area (19 countries)	Pearson Correlation	,091	,775**	1	,992**	,849**	,918**
	Sig. (2-tailed)	,611	,000		,000	,000	,000
	N	34	35	35	35	33	35
European Union (28 countries)	Pearson Correlation	,095	,813**	,992**	1	,871**	,945**
	Sig. (2-tailed)	,593	,000	,000		,000	,000
	N	34	35	35	35	33	35
G20	Pearson Correlation	,059	,830**	,849**	,871**	1	,934**
	Sig. (2-tailed)	,744	,000	,000	,000		,000
	N	33	33	33	33	33	33
OECD - Total	Pearson Correlation	,001	,929**	,918**	,945**	,934**	1
	Sig. (2-tailed)	,996	,000	,000	,000	,000	
	N	34	35	35	35	33	35

**. Correlation is significant at the 0.01 level (2-tailed).

Hypothesis H4: The growth rate of gross market value of OTC derivatives contracts is correlated with EUR/USD exchange rate.
Hypothesis $H4_0$: The growth rate of gross market value of OTC derivatives contracts is not correlated with EUR/USD exchange rate.

Table 4: Correlation matrix – hypothesis H4 (own calculations)

		EUR/USD growth	Gross credit exposure
EUR/USD growth	Pearson Correlation	1	,152
	Sig. (2-tailed)		,392
	N	34	34
Gross credit exposure	Pearson Correlation	,152	1
	Sig. (2-tailed)	,392	
	N	34	35

As shown in the table (Table 4) above, the Pearson correlation coefficient indicating a positive (r = 0.152) but statistically not significant correlation; therefore we fail to reject the hypothesis $H4_0$.

In the next step we studied the correlation between the growth rate of gross market value of OTC derivatives contracts and the growth rate of trade (portfolio) compression. Trade (portfolio) compression is a technique to reduce the number of transactions while ensuring that the value of the portfolio and risk remains the same, or that at least changes within acceptable levels. Financial institutions and commodity players have entered into compressions since the early 2000s primarily to reduce the cost of capital under regulations but more lately to address EMIR and DFA requirements. In essence, compressing portfolios is useful to reduce or transfer counterparty (credit) risk. Portfolio compression may also provide a more accurate expression of overall market size and composition.

Hypothesis H5: The growth rate of gross market value of OTC derivatives contracts is correlated with the growth rate of trade (portfolio) compression.

Hypothesis $H5_0$: The growth rate of gross market value of OTC derivatives contracts is not correlated with the growth rate of trade (portfolio) compression.

Table 5: Correlation matrix – hypothesis H5 (own calculations)

		GCE growth	ACNO growth
GCE growth	Pearson Correlation	1	-,090
	Sig. (2-tailed)		,848
	N	34	7
ACNO growth	Pearson Correlation	-,090	1
	Sig. (2-tailed)	,848	
	N	7	7

The conclusion of H5 test is that we fail to reject the null hypothesis (r = - 0.090).

4. CONCLUSION

It is too early to conduct a comprehensive assessment of the impacts (EY, 2014) of the regulatory reforms. The benefits and costs (Cognizant, 2016) of these reforms will largely depend on how these will interact with derivatives portfolios and affect the structure of the derivatives market more broadly. We hope that our findings may have some consequences for OTC market participants (J.P. Morgan, 2012).

5. SUMMARY

Following the G20 commitment to implement measures to increase transparency and reduce counterparty credit risk and operational risk in the OTC derivatives markets, the European Commission introduced a new EU Regulation on OTC, central counterparties (CCPs) and trade repositories, also known as European Market Infrastructure Regulation (EMIR). Simultaneously, in the U.S., the Dodd-Frank Wall Street Reform and Consumer Protection Act (DFA) seeks to deal with similar risk issues in relation to OTC markets (Jackson and Miller, 2013). A number of papers (FSB, 2015) have attempted to quantify various aspects of the OTC derivatives regulative reforms. Trends in OTC derivatives markets can be identified by tracking in parallel upward/downward movements (Oudéa, 2015) in the gross notional value of outstanding contracts and the gross market value. Over the past ten years, both, the notional amount outstanding and the gross market value have been altered by the increasing uptake of central clearing and the growing use of portfolio compression services or other risk-mitigation procedures. The analysis and hypotheses presented in this paper draw on five hypotheses (Zajačeková, 2016). The first hypothesis we test is whether the growth rate of gross market value of OTC derivatives contracts is different before and after regulatory reforms were introduced. Using data from the Bank for International Settlements (BIS), European Central Bank (ECB) and International Swaps and Derivatives Association (ISDA), we find that this difference was not statistically significant. The second hypothesis we examine is the correlation between the growth rate of notional amount outstanding of OTC derivatives contracts and the growth rate of gross market value of OTC derivatives contracts. Our conclusion is that this correlation is positive but also statistically not significant. Next, we extend our investigation to examine whether the growth rate of gross market value of OTC derivatives contracts is correlated with the GDP growth rate (hypothesis 3). Correlation matrix (Table 3) tells us that the correlation between the growth rate of gross market value of OTC derivatives contracts and the GDP growth rate is not statistically significant. Our regression results show that the growth rate of gross market value of OTC derivatives contracts is not correlated with EUR/USD exchange rate (hypothesis 4) and that the growth rate of gross market value of OTC derivatives contracts is not correlated with trade (portfolio) compression (hypothesis 5).

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