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THE INFLUENCE OF DEVELOPED COUNTRIES CENTRAL BANKS' UNCONVENTIONAL MONETARY POLICY ON THE ECONOMY OF UKRAINE

ВПЛИВ НЕТРАДИЦІЙНОЇ МОНЕТАРНОЇ ПОЛІТИКИ ЦЕНТРАЛЬНИХ БАНКІВ РОЗВИНЕНИХ КРАЇН НА ЕКОНОМІКУ УКРАЇНИ.

ВЛИЯНИЕ НЕТРАДИЦИОННОЙ МОНЕТАРНОЙ ПОЛИТИКИ ЦЕНТРАЛЬНЫХ БАНКОВ РАЗВИТЫХ СТРАН НА ЭКОНОМИКУ УКРАИНЫ.

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Abstract. *In the period of globalization, the economic shocks that occurred in one country quickly spread to other countries. So the actions of the developed countries' Central banks have a significant impact on other countries, in particular emerging markets countries. The paper considers an example of the impact of the European Central Bank, the Federal Reserve and the Bank of Japan's unconventional monetary policy on the Ukrainian economy. The purpose of the study is to assess the impact of the ECB, the Fed and the Bank of Japan's unconventional monetary policy on the financial indicators of Ukraine. The analysis is based on the event study methodology and constructing econometric models using the one least-squares method. The event study method allows to evaluate whether the time series of the studied indicators moves around a certain date. As a result, it was determined that the ECB's unconventional measures had the greatest impact on Ukrainian financial indicators, and the Bank of Japan had the least impact. Non-traditional measures of banks under study affected exchange rates and the yield of two-year government bonds. ECB and Fed's Unconventional monetary policy had an impact on the MSCI stock index, and the ECB policy also affected the interbank three-month rate. On the whole, the first rounds of*

unconventional monetary policy of the central banks under study have the main influence on the financial indicators of Ukraine.

Key words: *unconventional monetary policy, the European Central Bank, the Federal Reserve, the Central Bank of Japan, financial indicators.*

Анотація. *У період глобалізації економічні шоки які відбуваються в одній країні досить швидко поширюються на інші країн. Так і дії центральних банків розвинених країн світу мають значний вплив на інші країни, зокрема країни з ринком, що розвивається. В роботі розглянуто приклад впливу нетрадиційної монетарної політики Європейського центрального банку, Федеральної резервної системи і банку Японії на економіку України. Метою дослідження є оцінка впливу нетрадиційної монетарної політики ЄЦБ, ФРС і банку Японії на фінансові показники України. Аналіз базується на методі дослідження подій і побудові економетричних моделей методом 1 МНК. Метод дослідження подій дозволяє оцінити, чи рухаються часові ряди досліджуваних показників навколо певної дати. В результаті було визначено, що найбільший вплив на українські фінансові показники мали нетрадиційні заходи ЄЦБ, найменший вплив чинили дії банку Японії. Нетрадиційні заходи обраних банків впливають на зміну обмінних курсів і прибутковість дворічних державних облігацій. Нетрадиційна монетарна політика ЄЦБ і ФРС також впливала на фондовий індекс MSCI, і політика ЄЦБ ще впливає на міжбанківську тримісячну ставку. В цілому основний вплив на фінансові показники України мали перші раунди нетрадиційної монетарної політики досліджуваних центральних банків.*

Ключові слова: *нетрадиційна монетарна політика, європейський центральний банк, федеральна резервна система, центральний банк Японії, фінансові показники.*

Аннотация. *В период глобализации экономические шоки происходящие в одной стране достаточно быстро распространяются на другие стран. Так и действия Центральных банков развитых стран мира оказывают значительное влияние на другие страны, в частности страны с развивающимся рынком. В работе рассмотрен пример влияние нетрадиционной монетарной политики Европейского центрального банка, Федеральной резервной системы и банка Японии на экономику Украины. Целью исследования является оценка влияния нетрадиционной монетарной политики ЕЦБ, ФРС и банка Японии на финансовые показатели Украины. Анализ базируется на методе исследования событий и построении эконометрических моделей методом 1 МНК. Метод исследования событий позволяет оценить, движутся ли временные ряды исследуемых показателей вокруг определенной даты. В результате было определено, что наибольшее влияние на украинские финансовые показатели имели нетрадиционные меры ЕЦБ, наименьшее влияние оказывали действия банка Японии. Нетрадиционные меры выбранных банков влияют на изменение обменных курсов и доходность двухлетних государственных облигаций. Нетрадиционная монетарная политика ЕЦБ и ФРС также оказывала влияние на фондовый индекс MSCI, и политика ЕЦБ еще влияет на межбанковскую трехмесячную ставку. В целом основное влияние на финансовые показатели Украины имели первые раунды нетрадиционной монетарной политики исследуемых центральных банков.*

Ключевые слова: *нетрадиционная монетарная политика, европейский центральный банк, федеральная резервная система, центральный банк Японии, финансовые показатели.*

Introduction. In recent decades, the integration of countries into the global economy has accelerated. International shocks affect all countries without exception. But the strength of the impact depends on how vulnerable each individual country or region is to environmental changes. [*Kireyev, A., & Leonidov, A.*: 2015]

The implementation of unconventional monetary policy by the developed countries' central banks was a necessary measure in economically unfavorable conditions. Such actions by central banks of developed countries have various positive domestic effects. At the same time, the other

side of these unconventional measures is the cross-border effects and reaction of the developing countries' economies. Since, during the period of non-traditional measures, developed countries made huge injections of liquidity into financial markets, which significantly increased their balance sheets.

Large-scale operations by the ECB, the Fed and the Bank of Japan (BOJ) were selected to analyze the impact of unconventional monetary policy on emerging markets. These banks today still use these methods. Ukraine was chosen as an example of a country with an emerging market.

It is assumed that the unconventional monetary policy of the ECB, the Fed and the Bank of Japan have had a significant impact on emerging markets, including Ukraine. Ukraine is a small open economy, which means that exports and imports account for most of the GDP.

The purpose of research is to assess the impact of the unconventional monetary policy of the ECB, the Fed and the Bank of Japan on the financial indicators of Ukraine.

Recent literature review. In the world scientific and economic community at the moment, there is no unambiguous position about which exactly cross-border consequences has unconventional monetary policy. In particular, the issue of the nature of the impact of quantitative easing and other non-standard measures that were used central banks of developed countries on emerging markets is considerable debate. Sayuri Shirai [*Shirai S.*:2019], Ben Charoenwong, Randall Morck, and Yupana Wiwat [*Charoenwong B., Morck R., and Wiwat Y.*:2019] studied the influence of the unconventional monetary policy of the Central Bank of Japan. Koichiro Kamada, Tetsuo Kurosaki, Ko Miura, and Tetsuya Yamada examine how public information causes shocks and how much it affects the financial market [*Kamada K., Kurosaki T., Miura K., and Yamada T.*:2018]. Jai Won Ryoua, Saang Joon Baakb, Won Joong Kima analyze QE and QQE shocks based on their announcements on the economies of Japan and Korea using the vector autoregressive model [*Ryoua J. W., Baakb S.J., Kima W. J.*:2019].

Atsushi Inoue and Barbara Rossi study how unconventional monetary policy affects the exchange rate [*Inoue A., Rossi B.*:2019]. Tatjana Dahlhaus Garima Vasishtha examine the impact of US monetary policy news on portfolio flows to emerging markets The results show that the impact of unconventional shock on portfolio flows is generally economically small, but varies significantly across countries [*Dahlhaus T., Vasishtha G.*:2019].

Ana Paula Serra and Eurico Ferreira study the impact of the unconventional monetary policy of the Fed, the ECB and the Bank of England on the financial markets of developing countries. Using the event study methodology, the author comes to such conclusions that the announcement of unconventional monetary policy measures is significant for European stock markets [*Serra A. P. Ferreira E.:*2019].

David Bowman Juan M. Londono Horacio Sapriza examines the actions of US unconventional monetary policy and its impact on government bond yields, exchange rates, and stock prices in emerging economies [Bowman D, Londono J.M., Sapriza H.:2014]. Daniel J. Lewis proposes a new method for identifying announcement-specific decompositions of asset price changes into monetary policy shocks using intraday time-varying volatility [*Daniel J. Lewis:* 2019].

Yakubovkyi S.O, Alekseievska H.S. [*Якубовький С.О. Алексеєвська Г.С.: 2017*] and Kyfak A., Rodionova T [*Alekseievska H., Kyfak A., Rodionova T., Yakubovskiy S*: 2019] studied examples of applying unconventional monetary policy in the EU and the USA.

Falagiarda M., McQuade P., Tirpak M studied the impact of ECB unconventional policies on the economies of countries such as the Czech Republic, Hungary, Poland and Romania, and also explored various transmission channels of the secondary effects this policy. The authors conclude that the ECB's policy has a significant impact on emerging markets [*Falagiarda M., McQuade P., Tirpak M.*:2015].

Stann Carsten and Theocharis N. Grigoriadis in their study argue that the ECB's unconventional monetary policy had a significant impact on the economies of Eastern Europe and Russia [*Stann Carsten M., Grigoriadis Theocharis N.*:2019].

Data and methodology. In order to assess the impact of unconventional monetary policy measures by the ECB, the Fed and the Bank of Japan on the Ukrainian economy was using press

releases from these banks. Based on these data and use event study methodology was created database of unconventional monetary policy announcements for selected central banks for the period from January 1, 2008 to December 31, 2019. They are independent variables that take the values 1 on the day of the announcement of unconventional monetary policy and 0 on other days. The dependent variables are the exchange rate national currency to the euro, yen and US dollars., the stock market index, measured by the MSCI index of the Ukraine, a three-month interbank lending rate, a yield of 2 years sovereign bonds from 26 August 2011., due to the availability of data, and spreads on credit default swaps for 3, 5 and 10 years for the US dollar, euro and Japanese yen. The control variables included: the marginal lending rate of the ECB, the federal funds rate of the Fed and the Bank of Japan political rate; the European benchmark volatility index VSTOXX, for the United States - S&P 500 Low Volatility index, for Japan the NIKKEI Stock average volatility index and the Central Bank rate of Ukraine. All financial data was obtained from Thomson Reuters DataStream.

The effects of statements by the ECB, the Fed, and the Bank of Japan about non-standard monetary policy on financial variables are measured by ordinary least squares (OLS) regression. Metrology is based on an article by Stann Carsten M., Grigoriadis Theocharis N. (2019) [*Stann Carsten M., Grigoriadis Theocharis N.*:2019], their article focuses on the impact of ECB's unconventional monetary policy on emerging markets and the sampling period included 2009-2017. In this article was added next two years of observation 2018 and 2019. Our study focuses only on Ukraine and examine the influence of two more banks that used unconventional monetary policy.

General view of the regression:

$$Y_t = c + \beta_1 UMP_{j,t} + Y_{t-1} + \beta_2\, IR\_NBU_t + \beta_3 IR\_CB_{j,t} + \beta_4 Vol\ Index_{j,t} + \varepsilon_t \qquad (1)$$

Where *Yt* is a dependent variable (exchange rate, stock market index, three-month interbank lending rate, yield on 2-year sovereign bonds, spreads on credit default swaps for 3, 5 and 10 years). *UMP* - announcements of unconventional monetary policy, *Y(t-1)* - a lagged dependent variable, which was included due to the fact that investors are considering changes in the past for decision-making. *IR_NBU* is the rate of the national bank of Ukraine, *IR_CB* is the rate of the central bank whose monetary policy was studied, *Vol Index* is the volatility index. *j* - the central bank that applied unconventional measures. Also $\mathcal{E}$ is error term; *c* is a constant term; β - coefficients. This model was built separately for each bank and for each instrument of unconventional monetary policy.

Main research results. One of the factors determining the impact on the Ukrainian economy of unconventional monetary policy is the presence of economic relationships between countries. One such indicator is the level of trade relationships. Main part Ukrainy's exports fall to the countries of the European Union, the smallest to Japan.

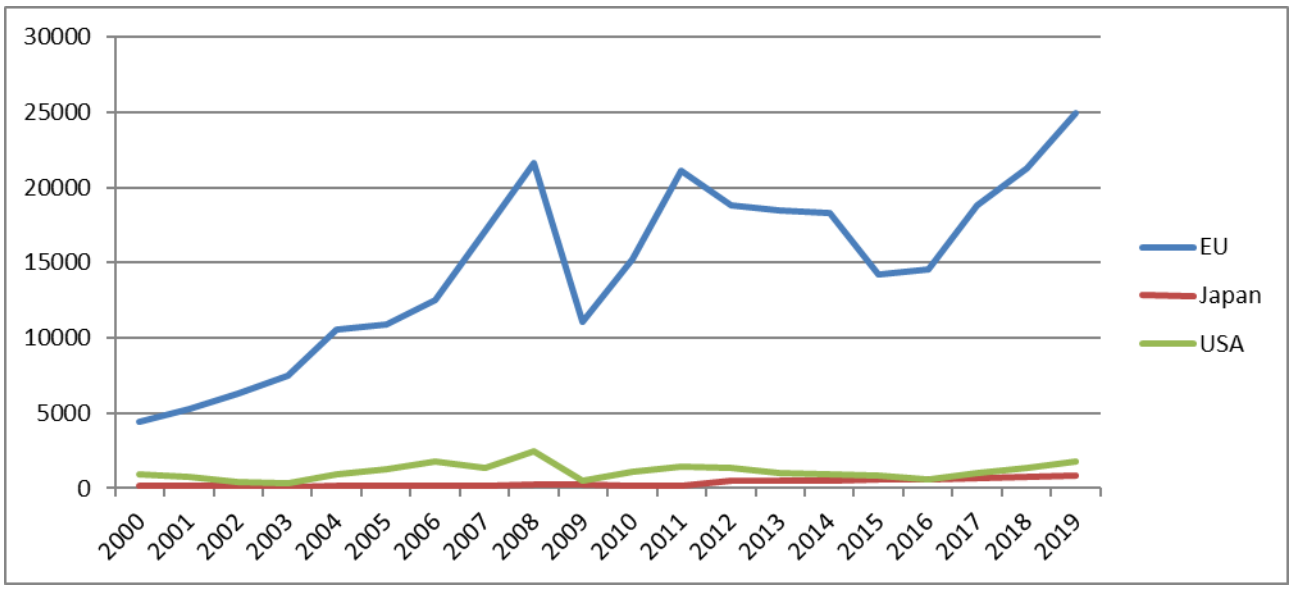

Fig.1 Ukraine's exports to the EU, USA and Japan 2000-2019 (mil.USD)
Source: [IMF]

In export and import trends, an increase was observed until 2009. That says the growth of horny relationships between countries. In 2009, when the effects of the crisis affected the whole world, both indicators were reduced. There was also a decrease in 2015 due to lower prices for the main Ukrainian export items (metals, grain) and a significant devaluation of the national currency.

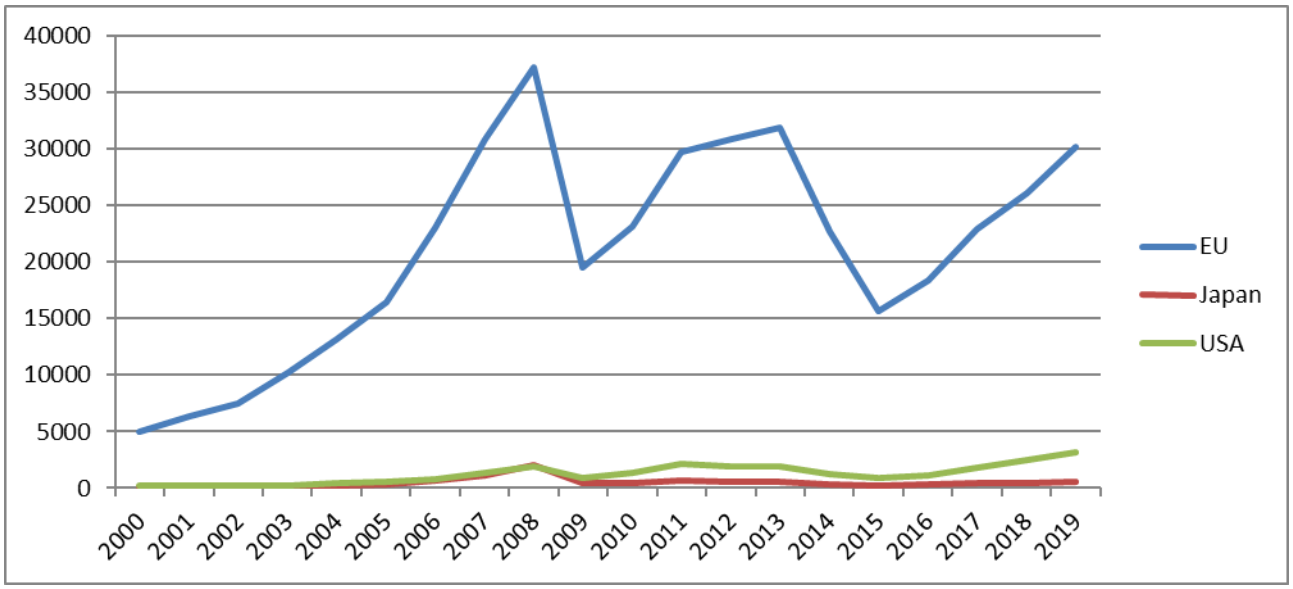

Fig.2 Imports of Ukraine from the EU, USA and Japan 2000 -2019 (mil.USD)
Source: [IMF]

The highest level of interconnection is observed between Ukraine and the EU countries, in trade in these countries in 2019 accounted for more than 35%, in the USA up to 10% and Japan a little more than 3%. Accordingly, it is assumed that the ECB's unconventional actions will have a stronger impact on the Ukrainian economy.

The results of assessing the impact of the ECB's unconventional monetary policy on Ukraine's financial indicators are presented in Appendix 1.

ECB unconventional measures such as FRFA, LTRO, FOR, CBPP2, CBPP3, ABSPP, PSPP, OMT, CSPP did not affect the financial variables of Ukraine.

The exchange rate was influenced by the Long-Term Refinancing Operations Program (TLTRO). As a result of this program, the exchange rate strengthened during the days the program was announced.

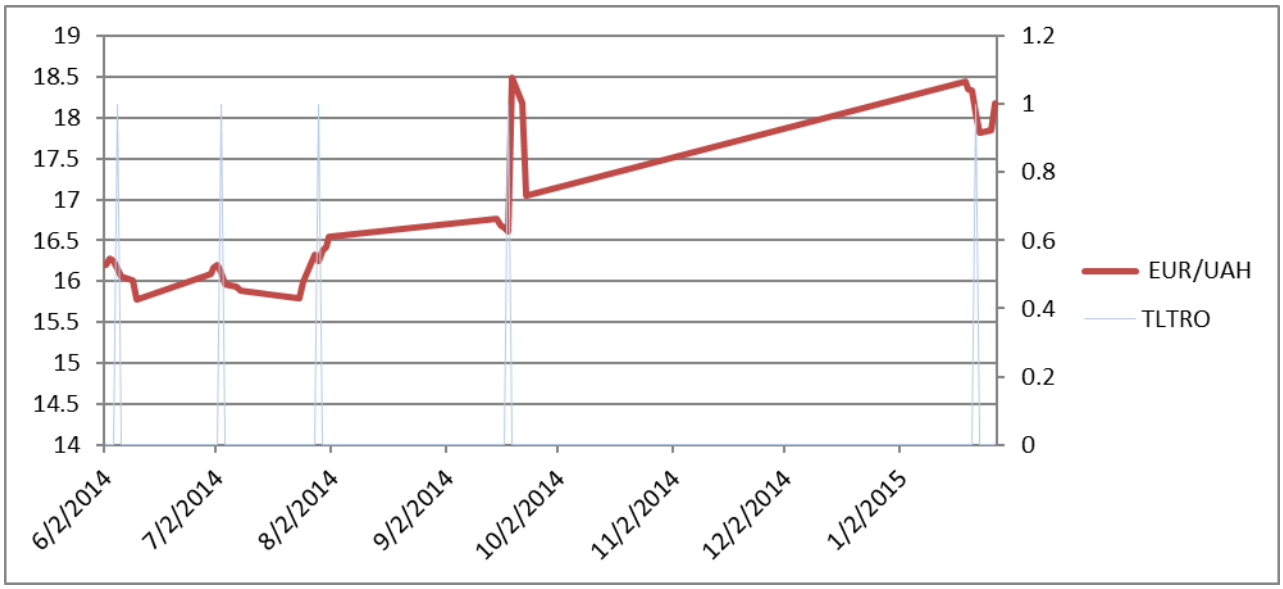

Fig3. Days of TLTRO policy announcement (05.06.2014, 03.07.201429.07.2014, 18.09.2014, 22.01.2015, 07.03.2019 and exchange rate.

Source: [Reuters' Datastream]

Figure 3 shows the tendency to revalue the exchange rate on the days when the program was announced. On the days before the announcement of the program, the devaluation of the exchange rate was visible, on the day of announcement the revaluation was observed, and in the next few days the tendency to revaluation continued, except for the announcement on September 18, 2014, the rate rose by 2 hryvnias from 16 to 18 UAH on the next day. According to the result of the model, the level of influence of this program is low because the coefficient is 0.23.

Asset purchase programs CBPP1 and SMP influenced on financial market indicator MSCI. In response to SMP announcements, stock indices in Ukraine grew by 12 percent, and during the implementation of CBPP1 policy fell by 10 percent (see appendix 1).

The first bond purchase program (CBPP1) influenced the interbank interest rate, as a result of which the rate decreased by 1%. This can be explained by the fact that one of the channels of unconventional monetary policy is the liquidity channel. Large banks in Ukraine are mainly owned by banks in the eurozone. These banks can receive liquidity from their parent bank and use it to replace liquidity available in the local money market. This may lead to lower demand for funds in the local money market and lower rates in the money market. As was observed in the Ukrainian market during the announcement of CBPP1 policy

The following were investigated Fed unconventional monetary measures. The results are presented in table 1

Table 1

The Impact of Fed Unconventional Monetary Policy

Dependent variable	Unconventional methods of monetary policy				
	LSAP1	LSAP2	LSAP3	FG	MEP
USD/UAH	-0,100 (0,090)*	0,009 (0,933)	-0,004 (0,949)	-0,013 (-0,183)	-0,006 (0,960)
MSCI	-0,741 (0,724)	1,084 (0,650)	0,657 (0,660)	0,481 (0,767)	7,824 (0,0056)***
INTERBANK 3M	0,017 (0,925)	0,050 (0,816)	-0,051 (0,708)	0,175 (0,234)	-0,011 (0,962)
2Y - ZERO YIELD	-	-	-0,503 (0,0247)*	-0,070 (0,899)	-0,462 (0,661)
CDS 3Y (USD)	34,387 (0,727)	-1,92 (0,986)	-28,4004 (0,683)	19,111 (0,801)	-26,008 (0,843)
CDS 5Y (USD)	34,232 (0,716)	-0,098 (0,999)	-20,600 (0,756)	19,523 (0,788)	-21,929 (0,862)
CDS 10Y (USD)	33,975 (0,708)	-2,013 (0,984)	-24,173 (0,707)	19,295 (0,783)	-18,780 (0,877)

Note: The numbers in the parentheses beside the Wald statistics are the P-values: ***, **, * represent the 1%, 5%, and 10% significance levels, respectively.

Source: author's calculations [Reuters' Datastream; Fed policy announcements]

The unconventional monetary policy of the United States affected the exchange rate, in particular, this is the first round of asset purchases conducted in 2008-2009. The exchange rate has responded to this policy by revaluing the national currency; this is also seen in Fig4.

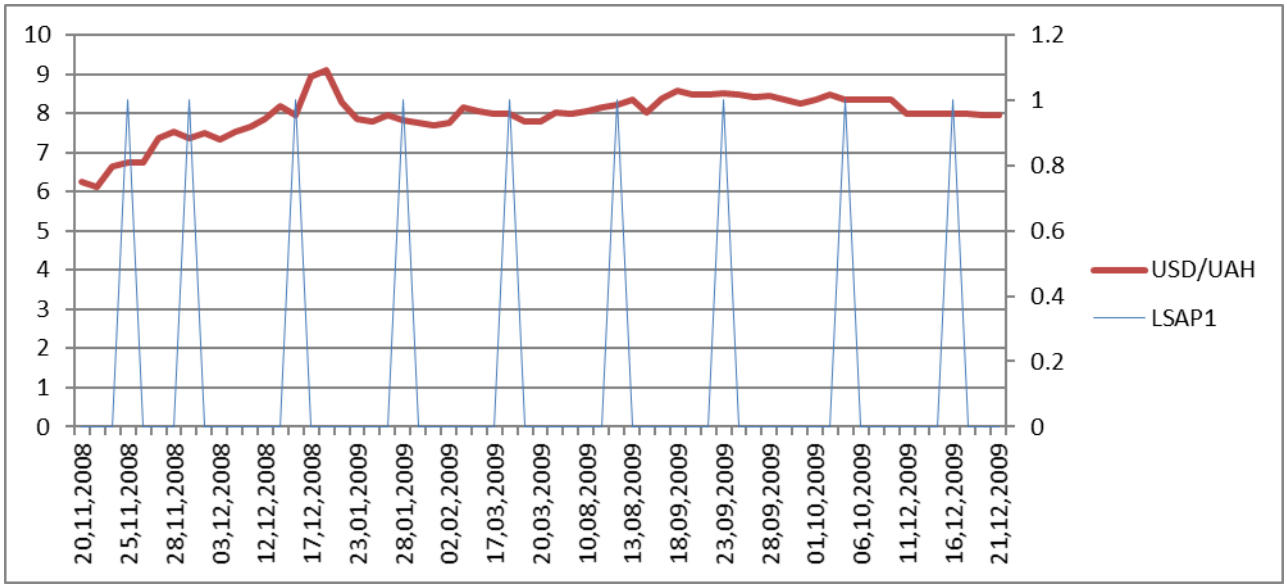

Fig4. LSAP1 Policy Announcement Days and Exchange Rate USD / UAH
Source: [Reuters' Datastream]

The level of influence of this independent variable is not high, and is 0.1 UAH.
And also the MEP policy, the twist operation that started in August 2011, was influential on the stock market index, measured by the MSCI index, which according to the results shows an increase

of 7%. Operation Twist is a tool aimed at changing the shape of the yield curve by simultaneously buying and selling long-term and short-term government bonds.

The results of the impact of non-traditional monetary policy programs of the Bank of Japan on the financial variables of Ukraine are presented in table 2

Table 2

The Impact of BOJ Unconventional Monetary Policy

Dependent variable	Unconventional methods of monetary policy			
	CME	QQ1	QQ2	NIR
JPY/UAH	-0.133 (0.0432)**	-0.051 (0.596)	-0.013 (0.702)	-0.029 (-0.212)
MSCI	2,805 (0,110)	0,874 (0,735)	0,055 (0,953)	0,177 (0,961)
INTERBANK 3M	10,052 (0,821)	-33,196 (0,440)	-51,81 (0,321)	-49,489 (0,991)
2Y - ZERO YIELD	0.27168 (0.0004)***	-0,157 (0,833)	-0,139 (0,6134)	0,163 (0,876)
CDS 3Y (JPY)	-0,889 (0,945)	-0,637 (0,937)	-1,132 (0,8732)	-0,991 (0,970)
CDS 5Y (JPY)	-0,933 (0,942)	-0,889 (0,963)	-0,9879 (0,888)	-0,947 (0,972)
CDS 10Y (JPY)	-0,976 (0,940)	-1,170 (0,9512)	-0,815 (0,907)	-0,891 (0,973)

Note: The numbers in the parentheses beside the Wald statistics are the P-values: ***, **, * represent the 1%, 5%, and 10% significance levels, respectively.

Source: author's calculations [Reuters' Datastream; BOJ policy announcements]

As well as the unconventional policy of the ECB and the USA, the measures of the Bank of Japan influence the exchange rate of the Ukrainian hryvnia and the Japanese yen. The national currency in the days of the announcement of the policy is strengthened by 0.1 UAH. This influence is not very significant.

Also, all the studied central banks have an impact on the yield of two-year government bonds. According to the analysis, as a result of the ECB's quantitative easing policy, in particular purchases of government bonds (PSPP 2014-2018), and the Fed's third round of purchases assets (LSAP3 2012-2014), government bond yields was reduced by 0.5%. And as a result of the Japan's comprehensive monetary easing policy (2010-2013) the yield on government bonds decreased by 0.2%. This influence probably passed through the liquidity risk premium channel. The fall in yields in the United States and the countries of the euro zone implies a relatively higher return on comparable assets of developing countries, including Ukraine. In this regard, investor interest in these countries is increasing, which may cause an increase in the volume of purchases of their government bonds. But the impact of the banks under study is not obvious, because Ukraine has huge economic instability due to the war in the eastern part of the country, the political crisis and the restructuring of external debt.

Conclusion. Ukraine has the closest relationship with the countries of the European Union. And this research confirms the hypothesis that the actions of the ECB are the most influential on the financial indicators of Ukraine.

The analysis shows that the exchange rates of the Ukrainian hryvnia to the euro, US dollar and Japanese yen were isolated from the influence of Central Bank announcements. This is confirmed by a minor influence. This is because the monetary policy in Ukraine only in 2015 actually switched from a fixed exchange rate regime to inflation control. The change of regime included the transition to a floating exchange rate.

Unconventional monetary policy announcements also had an impact on government bond yields and stock indices, but the Ukrainian stock market is underdeveloped, and this effect is small.

On the whole, the results confirm the hypothesis of the secondary effects exerted by the unconventional monetary policy of developed countries on emerging markets. The main influence was on the first programs of unconventional monetary policy of the ECB, the USA and the Bank of Japan. In those periods when unconventional measures were only introduced and it was difficult to regulate them and predict their consequences.

APPENDICES

Appendix I. The Impact of ECB Unconventional Monetary Policy

	FRFA	COLL	LTRO	TLTRO	FOR	CBPP1	CBPP2	CBPP3	SMP	PSPP	OMT	ABSPP	CSPP
EUR_UAH	0,002 (0,977)	0,004 (0,951)	0,011 (0,886)	-0,230 (0,077) *	0,027 (0,705)	0,117 0,555)	-0,004 (0,983)	0,061 (0,593)	-0,006 (0,973)	0,106 (0,286)	-0,0064 (0,675)	-0,056 (0,567)	0,075 (0,623)
MSCI	2.376 (0,193)	0,453 (0,761)	0,864 (0,552)	-2,196 (0,357)	2,012 (0,128)	−10.564 (0,0037) ***	2,940 (0,420)	-1,227 (0,560)	12,427 (0,0007) ***	0,026 (0,988)	-0,227 (0,935)	-0,935 (0,608)	-0,104 (0,975)
INTERBANK 3M	0,049 (0,766)	-0,166 (0,216)	-0,144 (0,2697)	0,216 (0,314)	-0,182 (0,126)	-1,066 (0,001)** **	-0,143 (0,663)	0,021 (0,908)	-0,075 (0,817)	-0,151 (0,359)	-0,022 (0,928)	0,087 (0,593)	0.081 (0.965)
2Y - ZERO YIELD	0,211 0,817	0,276 (0,560)	0,425 (0,511)	-0,181 (0,808)	-0,051 (0,932)	-	0,094 (0,928)	-0,395 (0,517)	0,259 (0,887)	-0,574 (0,072) *	0,028 (0,972)	-0,325 (0,538)	0,025 (0,975)
CDS 3Y	0,634 (0,994)	-8,773 (0,909)	18,380 (0,806)	48,144 (0,696)	3,322 (0,9612)	91,354 (0,627)	3,787 (0,984)	33,725 (0,757)	-3,428 (0.985)	13,90 (0,883)	4,175 (0,977)	28,772 (0,760)	4,224 (0,976)
CDS 5Y	0,397 (0,996)	-9,507 (0,899)	17,801 (0,808)	34,238 (0,776)	3,202 (0,961)	91,641 (0,617)	2,199 (0,990)	28,27 (0,791)	-2,586 (0,988)	11,653 (0,899)	4,062 (0,977)	24,799 (0,787)	4,51 (0,974)
CDS 10Y	0,382 (0,996)	-9,232 (0,891)	13,885 (0,843)	24,44 (0,832)	2,193 (0,972)	66,39 (0,706)	1,465 (0,993)	21,427 (0,833)	-1,41 (0,993)	7,067 (0,946)	4,080(0,976)	24.551 (0,815)	4,860 (0,971)

Note: The numbers in the parentheses beside the Wald statistics are the P-values: ***, **, * represent the 1%, 5%, and 10% significance levels, respectively.

Source: author's calculations [Reuters' Datastream; ECB policy announcements]

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