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## **Importance of forward contracts in the financial crisis<sup>1</sup>**

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**Abstract:** This research paper focuses on the level of development of the forward market in Serbia and examines the presence and advancement of use of forward contracts. Despite a de facto present volatility, the economy does not use this hedging instrument frequently. The research starts from the analysis of the legal framework that refers to the implementation of forward contracts, followed by the analysis of the level of development of the forward market, endeavouring to find the answer to the question why local companies have not yet clearly understood their own benefits from the use of this instrument in their day-to-day operations. The research is aimed to examine the use of forward contracts in Serbia, as well as the key economic and legal issues which are relevant for their successful implementation.

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## 1. Introduction

Any financial market carries risks for its users, but the main function of some markets is redistribution of risk. This is exactly what forward markets and derivatives markets do. They are most risky, but at the same time it is where risks may be reduced or eliminated. By raising awareness of the benefits of derivatives as the means for risk management, derivatives markets have grown (Đorđević, B., 2010). Trading on the forward market practically represents an integral part of all economies which have reached an advanced state of economic development and will play a more significant role in the series of other economies after they move ahead towards the above-mentioned stage of development (Serbia also belongs to the mentioned group of countries).

Serbia is a transitional country with a notable instability in terms of foreign exchange rate, inflation and other key macroeconomic indicators. On the other hand, the economy rarely uses financial derivatives, that is, forward contracts, as hedging instruments. The authors specifically focus on the reasons why companies make such financial decisions, trying to find out whether it results from the lack of modern banking services in respect of product advancement connected with financial derivatives, an insufficient level of development of the local stock exchange or, however, unwillingness of companies to use them. Answers to these questions, as part of the research findings, are given in the paper.

The main hypothesis that is tested is that companies operating in the local market, notwithstanding the higher foreign exchange rate volatility, rarely use forward contracts. Besides this, a secondary hypothesis focuses on the insufficient development of the financial derivatives market. Our goal is to establish, by testing the hypotheses, the degree of development of the forward market in Serbia and find an answer to the question why local businesses do not use forward contracts more frequently as hedging instruments and/or protection against foreign exchange rate risk. According to N. Fabris (2012), in a time of a crisis, risk management is becoming particularly important. Accordingly, financial derivatives as instruments for market risk management also gain importance. (Barjaktarović, L., 2010). According to Barjaktarović L. (2010), the use of cash management products in a crisis environment increases the percentage of collection of receivables and optimises the financial results of companies and banks. At the same time, collection management is the key stage in the process of credit risk management (Barjaktarović et al., 2011). We may draw a conclusion that the use of financial derivatives for the purpose of risk management in business operations of companies and banks, primarily through the use of forward contracts

in the local environment, is becoming more attractive and important, which in turn makes this topic more relevant.

The paper consists of four large parts. The first part describes the methodology that is used in the paper. The second part explains the definition, importance and instruments of the forward market. The third part deals with the analysis of the forward market in Serbia in the context of seeking an answer to the question whether Serbian companies need forward contracts. The fourth part presents the results of application of the correlation analysis and Value-at-Risk (VaR) method for the purpose of proving the initial hypotheses.

## 2. Methodology

For the purposes of this paper, the authors conducted quantitative and qualitative analyses. In the case of quantitative analysis, the authors used data derived from the survey conducted in banks and companies engaged in foreign trade operations and registered in the local market (Đenić, M., 2012). The survey was conducted in the summer and autumn of 2011 (June-October). It covered banks, based on the information obtained from the Association of Serbian Banks, and a number of small, medium and large companies dealing with foreign trade operations. For identification of companies, as well as their business performances required for research, the authors used data from the database of the Business Registers Agency and the Top 300 publication. All respondents use forward contracts, only in different directions, that is, one on the supply side (banks) and the other on the demand side (companies). The fact that the research has been analysed from both aspects makes the results even more significant. The questions in the survey for companies, referred to the main functions of forward contracts and the terms derived from such contracts, as well as the explanation of the form through which a forward deal is implemented. Furthermore, the survey included the questions like which papers need to be sent to the bank, what quantity of foreign exchange is purchased, which problems occur in relation to the implementation of forward contracts, as well as which banks they deal with in connection with forward contracts and whether banks are transparent enough when publishing the terms and conditions of forward contracts. On the other hand, banks were asked to specify the companies with which they commonly enter the mentioned type of contracts, the most frequent value of a forward deal and the bank transaction costs, as well as whether companies are satisfied with the forward contract service, based on their experience in cooperation with companies.

In the case of qualitative analysis, the authors used Value at Risk (VaR) method to measure foreign exchange risk and the *Pearson Product Moment Correlation – Ungrouped Data* for determination of the correlation between the economy's growth rate observed through the Gross Domestic Product and the number of forward contracts, as well as the correlation between the values of foreign exchange rate (USD/RSD) and the number of forward contracts.

When measuring foreign exchange risk by the VaR method, the open position is observed as a portfolio which gains or loses its value due to the changes in the foreign exchange rate. Historical simulation represents the simplest approach to the VaR method, which starts from the assumption on normal probability distribution (spread) for the observed variable. It is calculated as a percentage, through a standard deviation, by using the following formula:

$$\sigma = \sqrt{\frac{1}{N} \sum_{i=1}^N (x_i - \mu)^2}$$

*Pearson's Correlation Coefficient (Product Moment Correlation)*, denoted by  $r$ , is an index without dimensions that takes on values ranging from -1.0 to 1.0, including these values, and it reflects the spread of linear correlation between two sets of data. If variables are not correlated,  $r$  is zero. When higher values of the independent variable  $X$  correspond to the higher values of the dependent variable  $Y$  and vice versa (by a decrease in the values of the independent  $X$ , the values of the dependent  $Y$  also decrease), it is a positive correlation ( $r > 0$ ). Otherwise, when higher values of the independent variable  $X$  correspond to the lower values of the dependent variable  $Y$ , and/or when values of the independent  $X$  decrease while values of the dependent  $Y$  increase, it is a negative correlation ( $r < 0$ ). The general rule is: if the value of the coefficient of simple linear correlation is closer to 1, the interdependency between the observed phenomena is stronger. The correlation coefficient never has the value 1 or -1, as it would mean that there is a mathematical and not statistical relationship between the variables. For the calculation of the Pearson's Correlation Coefficient, there must be two sets of data. The following model is applied:

$$r_{x,y} = \frac{N \sum XY - (\sum X) \cdot (\sum Y)}{\sqrt{[\sum X^2 - (\sum X)^2][\sum Y^2 - (\sum Y)^2]}}$$

where  $r$  represents a symbol for Pearson's Correlation Coefficient,  $N$  a number of cases, the summation of products obtained by multiplying the data from columns  $X$  and  $Y$  from each row, sum of data from the variable  $X$ , sum of data from

the variable  $Y$ , the squared sum of data from the variable  $X$  and the squared sum of data from the variable  $Y$ .

### 3. Definition, importance and instruments of the forward market

Common and joint transactions, irrespective of the type of the financial market are (Jeremić, Z, 2003): a) prompt purchase and sale transactions where each purchase or sale of cash, securities or foreign exchange, in one word, each cash transaction is performed immediately, not later than within two to five business days from the date of concluding the deal; b) forward purchase and sale transactions where each purchase or sale of cash, securities or foreign exchange, in one word, each cash transaction is realised on a fixed future date which starts after the date defined for prompt purchase or sale transactions.

Forward stock exchange transactions are such stock exchange transactions where liabilities of the seller and buyer are not executed promptly, that is, immediately after conclusion of the contract, but in some future period which is predefined and fixed or on a fixed date within the future period in which the final deadline is fixed.

Considering the legislation, the main goal of the regulatory framework of financial markets is to strengthen confidence in financial markets and their participants. Incompatibility between the national approaches to the regulation of financial markets and their participants has led to the state reforms towards deregulation. In this sense, the functions of the government primarily concern the protection of market players (publication of information, punishments for illegal work with a view to protecting investors and strengthening mutual confidence), as well as maintenance of macroeconomic stability and competitiveness. It is considered that highly competitive markets are those markets that have a large number of autonomous and independent players, none of whom have a dominant role and where the market entry requirements are mild, depending only on the rate of return.

Regulatory institutions, including central banks, play an important role in the functioning of financial markets. They ensure the maintaining of stability of financial institutions' operations by applying monetary policy instruments directly to banks' operations (primarily through required reserves) and indirectly to other players in the financial market.

### 3.1. Financial derivatives

Instead of being taken as proprietary interest, like shares or bonds, each forward, option and swap contract is once or twice separated from the main product which is subject of the contract. Subject of the contract may be different goods (oil, metals, grain, etc.) or financial instruments. Although forward contract trading exists in its own right, the price of forward contracts depends on the trends of prices of basic goods or financial instruments. Forwards, options and swaps are used by many market participants as risk-reducing tools.

**Forward contract** basically represents a financial product, no matter whether it is based on goods (coffee, crops, crude oil, etc.), interest rates and foreign currency or stock market indices. A forward contract is an agreement between two participants in the trade that commits one party to sell an asset (subject of the contract) to the other party at a pre-agreed price on due date. Forwards may be classified as follows: 1) *Currency forwards* represent the most common type of forward contracts. Transactions carried out within currency forward contracts represent a perception of the future currency value. Volumes of market activities in the currency market are stronger in relation to any other market, which is the reason why trading in currency markets has an impressive profit potential. Introducing currency forwards has created an instrument by which international companies (or domestic companies dealing with imports and exports) and banks protect themselves against risk of a decrease in the value of currencies in the market. 2) *Commodity forwards* are the same as currency forwards, whereby the only difference lies in the fact that the former are based on goods and the latter are based on currency trading. Trading in commodity forwards is carried out on a stock exchange. 3) *Weather derivatives* represent the latest type of forwards, created for the purpose of protection against bad weather conditions and this has become the fastest growing market (Đorđević, B., 2010). Global climate trends and weather conditions have increasingly important impact on the performance of companies operating in the energy, agriculture, tourism, trade and transport sectors. Based on the numerous researches in the world, revenues earned in the above-mentioned sectors are in a negative correlation with the risk of unforeseeable weather conditions, which in turn has led to significant decreases in revenues and losses. The solution to the newly-emerged problem is weather derivatives that allow companies to protect themselves against reduced production and/or receivables related to goods and services, caused by unfavourable weather conditions. Weather derivatives are defined as forward contracts which are based on the weather indices (temperature, rain, snow, wind, frost, etc), obtained by measuring climate conditions from the selected reference point.

**Futures** are standardised contracts that anticipate the quantity of the underlying instrument on which they are based, as well as delivery period, minimum price range and other elements, which allows trading on futures stock markets. **Swap** contracts appeared in the period of volatility of interest and foreign exchange rates (1970s) when it became necessary for investors, who were exposed to rapid changes in interest and exchange rates, to transfer risks. Swaps represent contracts where interest payments are exchanged for financial instruments owned by contracting parties. Basically, there are two types of swaps: interest rate swap and currency swap. In the currency swap, parties exchange interest at the fixed interest rate, payable in one currency, for the fixed interest rate in another currency. In case of an interest swap, parties exchange payment at the fixed interest rate for payment at the variable interest rate.

**Options** offer the right, but also a possibility to renounce it. As a segment of forward market, options represent standardised financial contracts which give their buyers the right, but not the obligation to buy or sell a security (or commodities) at an agreed-upon price during a certain period of time. There are two main types of options: *call* and *put* options. Put options give the buyer the right to sell a certain number of shares at an agreed-upon price by the specific period of time. On the other hand, call options offer the buyer the right to buy shares at an agreed-upon price during a certain period of time. Both options impose the obligation on the seller and therefore the buyer of an option must pay a premium, which represents, in case the option is not used, gain for the seller. The premium amount is determined according to the basic price of the share and expectations regarding the future market trends.

### 3.2. Use of financial derivatives as hedging instruments

Since the emergence of the derivatives market, hedging operations are increasingly performed in the futures and forward markets (due to minor transaction costs, more expedient transactions, etc). Investors use forwards with a view to protecting a certain yield level through the transfer of risk to other trade participants. This risk is undertaken by speculators who take opposite positions from the hedgers and thus make the market liquid. Hedgers, however, protect themselves by the transfer of risk to other participants (speculators) against losses, but also reduce the possibility of profit increase. The use of financial derivatives has become very common. Arguments that support this lie in the fact that revenues of certain banks and other financial institutions are less unstable owing to an increasing use of derivatives. However, certain financial analysts point out that derivatives have become cheap instruments for mitigating shocks (Rose, S. P.,

Hudgins C. S., 2011) of the entire economic and financial systems. By using derivatives, risk-averse banks and other investors may considerably mitigate risk exposures by transferring risks to other investors who are willing to assume them. Likewise, financial markets are better capable of mitigating shocks incurred by a change in interest rates, securities prices, currencies, inflation or other factors.

Investors in the market may take one or both main positions that exist in the stock trade. The long position simply includes acquisition and holding of the acquired assets and this is frequently the only position of which numerous market players are aware. The short position is more complicated and often incomprehensible to ordinary investors. Hedging may be defined as the act of taking two opposite positions so that the potential loss from one position is neutralised by profit from the other position. In a perfectly established hedging, no loss (or profit) can be achieved. Profits and losses from the opposite positions give a zero sum in achieving any price in the market.

#### **4. Analysis of forward market in Serbia**

Financial derivatives in Serbia are defined under the Securities Law (2006). The Law, however, provides only a general definition and lists types of standardised financial derivatives and/or financial instruments which represent standardised contractual relationship between two or more parties, where implementation of the standardised contractual obligation depends on the fulfilment of the previously agreed contractual terms. According to the Law, the subject of a contract may be shares, interest rates, foreign currencies, certain types of commodities, stock exchange indices, etc. The main precondition for the use of financial derivatives and/or forward contracts is that the financial markets must be developed. Level of development is reflected through the level of financial infrastructure, variety of financial instruments and specialist knowledge of human resources. In Serbia, due to inadequate profitability of the economy, insufficient savings habits, high interest rates, lost confidence in the financial system, undefined ownership, the lack of specialised human resources and inflation, the level of development of the domestic stock exchange is very low and unsatisfactory.

In Serbia, only currency forwards are used and it is interesting to examine the basis for their implementation. In addition to the Securities Law, the main regulation that governs foreign exchange operations in Serbia is the Law on Foreign Exchange Operations (2006). At the same time, this Law represents the basis for adoption of appropriate decisions and instructions that closely define relevant areas such as the functioning of the foreign exchange market and formation of the

foreign exchange rate, as well as supervision of foreign exchange operations. Currency forwards in Serbia are performed in the financial market through banks. On the website of the Ministry of Finance and the National Bank of Serbia, relevant data on forward contracts is very limited, but the author of the paper engaged in the analysis of offers of banks in Serbia, as presented on their websites, and conducted a valid research based on such data. Through interviews with local companies using forward contracts and representatives of banks offering forward contract services, the results of the research were compiled.

The data provided by the National Bank of Serbia (NBS, 2012) indicate that there are presently 33 banks operating in Serbia, of which more than 80% are foreign-owned. Furthermore, 32 banks have the authorisation for international banking operations, except Jugobanka jugbanka Kosovska Mitrovica. Please find below the table presenting the use of forward contracts by banks.

**Table 1: Use of forward contracts in Serbia**

Banks	Forward	Purpose
Alpha bank	+	For financing exports and financing imports of production materials
Banca Intesa	+	For financing exports, financing imports of production materials and credit lines granted by the Italian Government, EIB, EBRD, EAR
Erste bank	+	For financing exports and financing imports of production materials
Raiffeisen bank	+	For financing exports and financing imports of production materials
Société Générale	+	For financing exports and financing imports of production materials
Unicredit	+	For financing exports, financing imports of production materials and credit lines granted by the Italian Government

Source: websites of banks, information taken in the period June-August 2011

When analysing the offer of banks in the local market, it can be seen that the offer of banking products in the field of forward contracts is present in 6 of 33 banks (which accounts for 18%). Conducting credit operations, including forward contracts, is limited, first by client's creditworthiness and then by credit policy of the parent bank. A forward contract may be seen as a credit transaction for two reasons. First, the amount at which something will be bought today for a certain future period of time is pre-agreed. At the time when it is agreed, it is quite likely that the mentioned assets will exist at a certain date in future. Therefore, we obtain something with deferred payment, which is typical for credit transactions. The second reason is that a forward contract can be seen as based on two strate-

gies. The first strategy is that, if an amount in Euros is purchased at spot rate and deposited for one month, from the aspect of consumption, the mentioned assets will be taken into consideration only after one month. The second strategy is that, if the purchase of Euros is agreed today at spot rate, provided that it will be realised in one month, only then the payment in Dinars is effected and Euros obtained, while in the meantime, the given Dinar amount may be placed as a time deposit for one month. Thus, according to the interest rate parity and interest rate differential that are meant to eliminate risks, the first or the second strategy will be more attractive, depending on the fact which currency has a higher interest rate. Although it was mentioned above that forward contracts may be seen as credit transactions, there is, however, one inconsistency. In case of a classical credit transaction, assets are obtained immediately and payment is made at a later point in time. In case of forward contracts, however, assets are obtained in future, not immediately.

In late 2008, local banks with foreign capital implemented restrictive credit policy towards certain industrial segments, such as construction, production and sale of vehicles, energy, textile industry, metal processing, tourism, furniture manufacturing and exporters of fruits and vegetables (Barjaktarović et al., 2011). Furthermore, forward contracts are limited by legal regulations according to the above-mentioned Securities Law, but also by provisions in the banks' balance sheets according to NPLs, as well as the required reserve for various finance sources and lending operations. In addition to the above reasons, knowledge of companies engaged in foreign trade operations is important as they have to be aware of the benefits of forward contracts. It is important to emphasise that in foreign trade operations it is necessary to analyse the risk of each foreign trade transaction, i.e. the ability of the exporter and/or importer to see the transaction through and not to focus on the payment ability of the banking product user. Banks with registered offices in the European Union (primarily Raiffeisen bank and UniCredit) have developed special products for internationally active clients – *cash management* products (Barjaktarović, 2010c). Unfortunately, their local banks may offer their clients only simpler products, partly due to the legal regulations governing this area and partly due to the level of development of software they use.

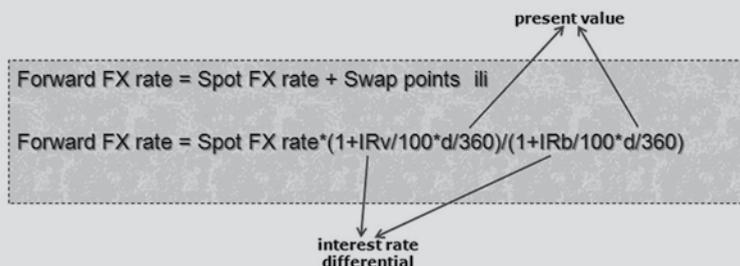
In accordance with the aforesaid, most banks in Serbia currently offer quasi forwards, whereas they offer forwards only to the top-rated clients of banks. Quasi forward is a type of forward transaction in which bank and client conclude a transaction by which they define the foreign exchange rate at which the bank sells foreign currency to the client which the latter can use for the payment of future liabilities in the period of the minimum two days and maximum one year following the transaction date (the client is obliged to provide an appropriate

dinar coverage for the purchased foreign currency) (Barjaktarović, L., 2010). Unlike real forward contract, where exchange of both currencies occurs on a future date, with quasi forward contract the client undertakes to provide at the contract date the appropriate dinar coverage for the agreed transaction, while foreign currency can be used for payments abroad. For a successful use and implementation of forward contracts, cooperation between banks, clients and representatives of regulatory bodies and professional associations is necessary so that all parties involved are duly informed about the opportunities and benefits of using forward contracts as well as to analyse how these contracts may be further improved with a view to cutting costs and reducing risks in a particular foreign trade transaction.

### Example: A local bank that offers forward contracts and a local firm that uses forwards

Calculation of the forward exchange rate in a purchase/sale forward FX transaction is made so that the prompt exchange rate is reduced or increased by a certain number of points that represent the value of interest rate difference for the same period of time. Points are deducted from the exchange rate of the currency which in the same time period has a higher interest rate and are added to the currency which in the same time period has a lower interest rate. The main purpose of banking operations with forward purchase/sale of foreign currencies is to hedge against exchange rate risk. Thus, a forward transaction is protected against exchange rate and interest rate risks, both for the buyer and the seller. Risk from the buyer or the seller default still remains and it is technically called credit risk. Firms believe that they protect themselves by arranging future exchange rate, but accounting entries are made on the date of settlement and/or payment of liabilities towards foreign partner (at such date it is evident whether the firm has or has not protected itself against exchange rate changes). Forward exchange rate results from the interest rate differential of the currencies which are subject of a transaction and includes time value of money and interest rate parity theory.

Figure 1: Calculation of forward exchange rate (a)





positions. A bank compiles daily reports on the foreign exchange risk indicators. The VaR method is used<sup>2</sup> for the measurement of foreign exchange risk.

**Table 3: VaR simulation**

VaR - HISTORICAL SIMULATION (HS)				
Position Date:	14/03/2012	Confidence Level (%):	99%	
Reporting Currency:	EUR	Time Window:	1 Year	
Mark to Market Date:	14/03/2012	Decay Factor ( $\lambda$ ):	0.94	
Holding Period:	1 Day	Differentiation Method:	% $\Delta$	
RISK SUMMARY: 1 Day VaR (C.L.:0,99) in EUR				
<i>Uncor. VaR</i>	<i>Portfolio VaR</i>	<i>Max Profit</i>	<i>of Portfolio</i>	<i>Hedge Effect</i>
-356,716	-356,716	432,660	-2.33%	0.0%
Position Details (in absolute figures)			Value at Risk	
Ccy	Local Ccy n Position in EUR	Uncorrelated VaR	as %	
USD	-20,000,000	-15,311,591	-356,716	2.3%

The obtained results, presented in Table 2, show that VaR analysis is used in order to disclose loss that a firm may incur without hedging. More precisely, position date represents the date when the position is opened and/or the date when, in this particular case, a local company agreed purchase of crude oil with forward value date (value date of 30 days has been arbitrarily set). Therefore, the aim is to show how much a local company may have lost on exchange rate differences in one month (30 days) if it had not hedged. The date 14/03/2012 was taken as a starting date. Reporting currency is EUR. It means that the loss on exchange rate differences due to fluctuations of the EUR/USD exchange rate shall be expressed in the currency EUR. Mark to market date represents the date on which market data is taken (in this case, foreign exchange rate). Holding period is a time period of holding open foreign exchange position. The application is calculated as one-day VaR and 10-day VaR. The data may be easily translated in any holding period, e.g. to keep open position for 30 days, by using a formula which is presented in the second part of the paper. Confidence level shall be understood to mean the level of confidence (it is normal distribution of maximum loss probability or 99% level of confidence). Time window is historical time period based on which the application calculates exchange rate volatility. Decay factor represents the corrective factor which serves as weight in order to adapt higher weight to the "more recent" exchange rate changes. The value of 0.94 is typically taken. Finally, differentiation method may be classical relative (percentage) change or log-normal change of the observed variable. In the specific example, it is the exchange rate and percentage change will be applied, whereas the result of VaR analy-

<sup>2</sup> For the needs of the research, VaR simulation is done on the example of the bank and the client operating in Serbia, but for the purpose of data protection, the authors do not use the original names of the bank and the firm; they refer to these entities as a "local bank" and a "local company".

sis will be analysed for one-day VaR, for the open position of USD 20 million. We started from the assumption that the company ordered oil in the value of USD 20 million on 1 January 2012, with the date of payment and/or delivery in 30 days, i.e. 1 February 2012. The total loss, according to VaR simulation, as shown in Table 2, is EUR 356,716 EUR. Consequently, it is the maximum loss for one day at the confidence level for a specific time period. As in this particular example we need a 30-day VaR, it is calculated as a product of one-day VaR and square root of time (in this case, the square root of 30), which gives the total loss of EUR 1,961,938 ~ 2 million.

The local company imports and/or buys crude oil in the international market in the United States dollar (USD) and therefore it needs to hedge foreign exchange risk caused by the fluctuations of the RSD/USD exchange rate. While fixing the USD/RSD exchange rate by using a currency forward for a period of several months, the local company fixes major variable costs in its income statement and thus ensures the selling price stability (it does not have to transfer currency risk to the selling price and end-users) and, accordingly, ensures stability of its profits. The value of forward contracts with the local company ranges between USD 1 and 5 million in nominal value, whereby the company may sometimes buy more than one forward contract in one day. Therefore, based on the above, it can be seen that the value of forward contracts is generally not high, bearing in mind the size of the company and volume of its business operations. The mentioned currency forward contracts which are carried out in the Serbian market are also known as quasi forward contracts. With these quasi contracts, bank requires, as hedging against credit risk, induced by foreign exchange risk, the maintenance margin (as a certain percentage of the contract value) and right to "margin call". In addition to the above-mentioned, there are also 100% deposit-backed forward contracts and the local bank performs exactly that type of forwards with the said local company. There are no other types of forwards, as it was stressed above. In the market, there are also interest-rate forward contracts, though banks do not use this derivative, for hedging against interest rate risk, but Interest Rate Swap (IRS), which is actually practiced by one bank only. With the adoption of the new Law on the Protection of Beneficiaries of Financial Services, a number of banks to use IRS will certainly increase, but interest rate forwards are still not likely to come into practice.

When speaking of the value of a forward contract, it should be taken into consideration that it is a non-standardised financial derivative for which, as a rule, there is no secondary market and therefore it has no market value, i.e. it has no price like futures or options. The underlying basis of each forward contract is a nominal value of fixed assets and, in case of currency forward contract, certain currency represents the main assets. As for transaction costs, fees are included in the price, including interest on dinars as long as the bank does not sell foreign currency.

Analysing the offer of six banks that offer forward contracts in the Serbian market, it is noticed that the service of forward contracts as a banking product is transparent and clear. Companies may be dissatisfied if they have made a wrong assessment in betting the exchange rate movements; otherwise, those who use forwards as hedging already included that cost in their prices.

## 5. Results of the quantitative analysis

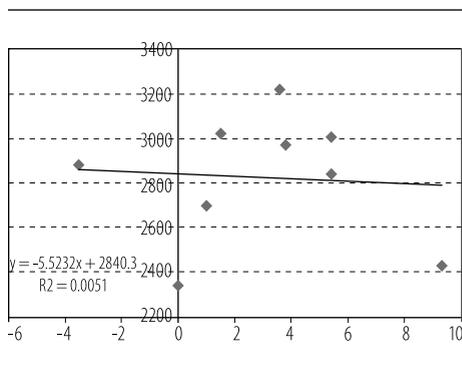
Foreign investors may not engage in direct purchase of domestic short-term instruments. The main channel for placing dinar potential of foreign investors is currency swap transactions with local banks. Moreover, many local banks use currency swaps for providing dinar liquidity under more favourable conditions than it would be possible on the money market, while at the same time maintaining the neutral foreign exchange position by which they ensure protection against currency risk. One group of local economists think that the described mechanism is the main factor of stability of the local currency exchange rate. All in all, foreign exchange rate is the market rate and it is formed by confronting the supply and demand, but the higher supply in currencies does not come as a result of the strengthening of the Serbian economy, growth in export potentials and other desirable factors, but as a result of the administrative increase in the promised yield on dinars.

It further means that in the circumstances of weakening inflationary pressures and consequent decrease in the repo rate, trends towards closing the dinar positions of foreign investors (exiting dinar instruments) can be expected, as well as higher demand for euros, which will lead to a foreign exchange rate increase. As a result, we will hear notorious stories of domestic businessmen (primarily import-oriented or import-dependent businessmen), complaining of huge losses in their balance sheets due to negative exchange rate differences. That brings us to the critical point in the research herein, that is, the question why forward contracts are insufficiently used.

Before analysing the correlation results, it should be noted that the values as well as the number of forward contracts are linked to the company's business cycle and that there is no constant volume. The correlation coefficient serves as a measure of linear dependence of the variables  $X$  and  $Y$ , defined through variances and covariances of random variables  $X$  and  $Y$ . In the specific case, the first correlation shows the relationship between the growth rate as an economic growth indicator and the number of forward contracts. The idea is to show whether the use of for-

ward contracts indirectly contributes to achieving the economic growth. Hitherto results and/or values of correlation (-0.071) and covariance (-75.725) show that there is insignificant relationship, i.e. interdependence between the two observed variables. This confirms that the use of forward contracts in the domestic economy does not influence or contribute to the economic growth. The use of forward contracts in Serbia is seen as the ability of a company to manage risks within its business cycles in an active and responsible manner, and nothing more than that.

**Graph 1: Correlation between GDP growth rate and number of forward contracts**



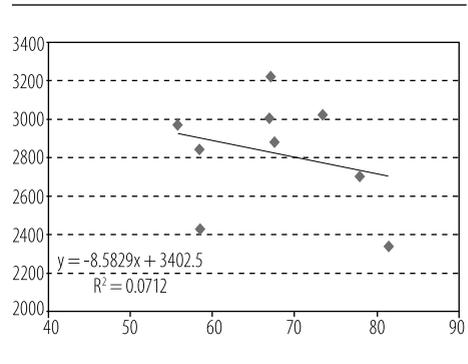
**Table 4: Pearson's correlation between GDP growth rate and number of forward contracts**

Pearson's correlation – ungrouped information		
Statistical information	Variable X (GDP growth rate)	Variable Y (number of forward contracts)
Mean value	2.944444444	2824
Biased Variance	12.18691358	73472
Biased Standard Deviation	3.490976021	271.0571895
Covariance	-75.725	
Correlation	-0.071134284	
T-Test	-0.188681602	
p-value (two-sided)	0.855696099	
p-value (one-sided)	0.42784805	
Degree of freedom	7	
Number of observations	9	

The second correlation observes the relationship between exchange rate movements and the number of forward contracts. The idea is to see whether a higher volatility in foreign exchange rates will result in an increased use of forward contracts. The obtained results, that is, the values of correlation (-0.27) and covariance, as a measure of strength of the correlation between the variables (-685.9725) indicate that the value is between moderate and low interdependence. Consequently, there is higher correlation between the two previously ob-

served variables, but still insufficiently strong connection. This shows that in the domestic economy the use of forward contracts is not connected with and/or does not depend on the volatility of the foreign exchange rate. Higher volatility of the foreign exchange rate is still not the determinant of demand for forward contracts, especially not for smaller firms.

**Graph 2. Correlation between values of exchange rate (USD/RSD) and number of forward contracts**



**Table 5: Pearson's correlation between values of exchange rate (USD/RSD) and number of forward contracts**

Pearson's correlation – ungrouped information		
Statistical information	Variable X (exchange rate USD/RSD)	Variable Y (number of forward contracts)
Mean value	67.40333333	2824
Biased Variance	71.04244444	73472
Biased Standard Deviation	8.428668011	271.0571895
Covariance	-685.9725	
Correlation	-0.26689123	
Coefficient of Determination	0.071230929	
T-Test	-0.7327055	
p-value (two-sided)	0.487541902	
p-value (one-sided)	0.243770951	
Degree of freedom	7	
Number of observations	9	

Considering that currency forward contracts represent an instrument for hedging against FX risk of companies, their use should be increasing with higher volatility of foreign exchange rates. However, the situation in the market and results of the conducted research prove the opposite. Large companies carry out forward contracts constantly, irrespective of the exchange rate trends, but depending exclusively on their own foreign currency inflows or outflows. For larger companies, a business cycle is the most important determinant for the use of financial

derivatives, or more specifically, in this case, forward contracts, while small firms do not use forwards in their daily operations at all.

The starting point of the research focused on the question why local companies have not yet clearly determined their own benefits from using forward contracts in their daily business. Based on the obtained results of the research, the answer lies in the fact that, on the one hand, use of forward contracts does not influence the economic activity and, on the other hand, even an increased volatility of foreign exchange rates does not lead companies to use these contracts. Therefore, there are no significant benefits from the use of forward contracts which companies directly observe in their operations, so they do not consider them important. Such attitude is particularly true for small companies, while in case of large companies, as it was stressed more than once in this paper, the use of forward contracts is exclusively connected with business cycles and depends on the specificity of activity conducted by the company and/or type of goods traded by the company (e.g. NIS, EFT, Rudnap, etc).

## 5. Conclusion

In a modern business environment, there are high oscillations and threats from unforeseeable external shocks. It is of primary importance to choose an adequate method of payment that will provide, to the largest possible extent, security and/or minimise occurrence of a risk event. To that end, financial derivatives which ensure security of receivables are becoming more important today. From the aspect of banking operations, development of modern financial products, including operations with financial derivatives, is of utmost importance. More intensive use of these instruments would contribute to long-term and more stable sources of funding for the optimisation of matching the maturities of assets and liabilities.

The results obtained in this research undeniably show that although currency forward contracts represent an instrument for hedging against FX risk, their use does not increase with higher volatility of foreign exchange rates. The main reason for such situation lies in the fact that forward contracts are conducted by large companies, that is, companies with developed risk management awareness. These companies use forward contracts on an ongoing basis, irrespective of the movements of the foreign exchange rate. Actually, they use these contracts subject to their own foreign currency ins and outs (i.e. liabilities). Consequently, for larger firms a business cycle is the most important determinant for the use of financial derivatives. Other firms still complain about the foreign exchange flexibility and expect the National Bank of Serbia to eliminate the risk of foreign

exchange rate changes, instead to hedge it through forward contracts. Therefore, the higher foreign exchange rate volatility does not represent an important determinant of the demand for forward contracts for most companies in Serbia.

The main reasons for the lack of use of forward contracts and other financial derivatives in Serbia are, first of all, the unclear regulatory framework and the consequent limitations only to hedging transactions due to the limited legal regulations, as well as inadequately developed companies' awareness of the necessity to hedge against risks. Other possible reasons that may explain why the economy insufficiently uses currency forwards as instruments for hedging against FX risks are neglecting the foreign exchange rate volatility, while ignoring risks and leaving it to the government and the National Bank of Serbia to stabilise the foreign exchange rate. It is true that the government and the National Bank of Serbia are responsible for establishing the macroeconomic environment that will allow stable conditions for doing business and, accordingly, they are responsible for systemic risk factors, including currency risk. Nevertheless, according to the present monetary policy, the main objective of the National Bank of Serbia is price stability (low and foreseeable inflation), not foreign exchange rate targeting. Therefore, the reliance of local firms on the central bank and the state, in terms of the foreign exchange rate and risk elimination, is completely unjustified. Furthermore, underdeveloped entrepreneurial spirit and the lack of understanding of business risks, as well as inadequate education, are just some of the reasons why local companies do not use forward contracts. Besides, it is a fact that many entrepreneurs have already hedged themselves, admittedly not by means of sophisticated instruments, but simply by building their selling prices on the exchange rate of RSD 115 to 120 for 1 euro. Moreover, an objective reason also lies in the fact that it is not possible to agree forward contracts with long maturities that would serve as hedging of long-term liabilities denominated in foreign currency in a company's balance sheet liabilities.

To conclude, the paper emphasises numerous advantages of financial derivatives as modern financial instruments. However, taking into consideration the risks that financial derivatives potentially entail due to the undefined legal norms and at the time of the global economic crisis, they offer room for abuse. Future research will focus on monitoring the use of other financial derivatives in the Serbian market.

## 6. References

1. Acemoglu D., Johnson, S., Robinson, J. (2004), *Institutions as The Fundamental Cause of Long-Run Growth*, Working Paper 0481, available at: <http://www.nber.org/papers/w10481>
2. Anderson, D, et al (2007) *Statistics for Business and Economics*. Thomson Learning.
3. Barjaktarović, L. (2010), *Monetarno-kreditni i devizni sistem*, Univerzitet Singidunum, Beograd.
4. Barjaktarović, L. (2010b), *Upravljanje rizikom*, Univerzitet Singidunum, Beograd.
5. Barjaktarović, L., Popovčić-Avrić, S., Đenić, M. (2011) *Collection management as curtail part of credit risk management during the crisis*, The book of proceedings 8th AFE 2011 Samos, p. 182-191
6. Barjaktarović, L., Popovčić-Avrić, S., Đenić, M. (2011a) *Upravljanje naplatom potraživanja u bankarskom sektoru Srbije u vremenu krize*, Finansije 1-6/2011, str. 80-102
7. Barjaktarović, L (2010c) *Koncept Cash Management-a*, Bankarstvo 3-4 2010, Udruženje banaka Srbije, str. 36-51
8. Barjaktarović, L., Ječmenica D. (2011) *Optimizam vs. pesimizam konkurentnosti bankarskog sektora Srbije*, Industrija 2/2011, Ekonomski institut Beograd, str. 137-150
9. Bjelica, V. (2001), *Bankarstvo, teorija i praksa*, Stylos, Novi Sad.
10. Brealey, R., Myers, S., Marcus, A. (2001), *Fundamentals of Corporate Finance*, Third Edition, McGraw-Hill Prims, New Jersey.
11. Doherty, N. (2000), *Integrated risk management – techniques and strategies for managing corporate risk*, McGraw Hill, Inc.
12. Dragutinovic, S., Filipović, S., (2009), *Faktori od značaja za kretanje cena na robnim berzama*, Ekonomski institut Beograd
13. Đenić, M. (2012) *Primena forvarda kao finansijskog instrumenta u Srbiji*, Univerzitet Singidunum, Beograd
14. Đukić, Đ., Bjelica V., Ristić, Ž. (2004), *Bankarstvo*, Centar za izdavačku delatnost Ekonomskog fakulteta u Beogradu, Beograd.
15. Đorđević, B., (2010), *Razvoj tržišta i karakteristike trgovanja vremenskim derivatima na svetskim berzama*, Fakultet za menadžment Zaječar, Megatrend univerzitet Beograd
16. Freund, J., Perles, B. (2007), *Modern Elementary Statistics*. Pearson.
17. Jeremić, Z. (2003), *Finansijska tržišta*, Univerzitet Singidunum FFMO, Beograd.

18. Kozarić, K., Fabris N., (2012), *Monetarno-kreditna politika*, Štamparija Fojnica, Sarajevo.
19. Kozarić, K., Fabris, N. (2012), *Monetary policy at crisis times*, Journal of Central Banking Theory and Practice, No.1, pp. 5-20, Centralna banka Crne Gore.
20. Vernimmen, P. (2005), *Corporate Finance – Theory and Practice*, John Wiley&Sons, Ltd, Chichester.
21. Levine, R., (2004), *Finance and Growth: Theory and Evidence*, Handbook of Economic Growth, University of Minnesota and the NBER
22. Levine, R., (1997), *Financial Development and Economic Growth: Views and Agenda*, University of Virginia
23. Rose, S. P., Hudgins C. S. (2011), *Bankarski menadžment i finansijske usluge*, Data status.
24. Salvatore, D., (2009), *Međunarodna ekonomija*, Centar za izdavačku delatnost ekonomskog fakulteta, Beograd.
25. Stephens, L. (2006) *Beginning Statistics*. McGraw Hill.
26. Triola, F. (2006) *Elementary Statistics*. Pearson.
27. Vuković, D. (2005), *Factoring i forfeting : aspekt rizika u finansiranju spoljne trgovine*, Bankarstvo, Beograd , br. 1-4, str.13-24.
28. Zakon o bankama i drugim finansijskim organizacijama, Službeni glasnik Republike Srbije broj 107/2005 od 02.12.2005. godine
29. Zakon o deviznom poslovanju, Službeni glasnik Republike Srbije broj 62/2006 od 19.07.2006. godine
30. Zakon o spoljnotrgovinskom poslovanju, Službeni glasnik Republike Srbije broj 101/2005 od 21.11.2005.
31. Zakon o hartijama od vrednosti i drugim finansijskim instrumentima, Službeni glasnik Republike Srbije broj 47/06
32. Quarterly Review, September 2010, BIS, Basel
33. Whaley, R. (2006), *Derivates – markets, valuation and risk management*, John Willey & Sons, Inc., New Jersey.
34. Williamson, O. E. (2002), *The Theory of the Firm as Governance Structure: From Choice to Contract*, Journal of Economic Perspectives 16 (3), str. 171–195, available at: <http://groups.haas.berkeley.edu/bpp/oew/choicetocontract.pdf>. Retrieved 2009-06-06.

## APPENDIX 1. Measurement of foreign exchange risk- Back-testing

Date	VaR	P&L	Max Profit
7.9.2009	-2,337	-340	2,240
8.9.2009	-14,596	563	12,750
9.9.2009	-3,994	-47	3,698
10.9.2009	-8,058	-81	7,025
11.9.2009	-14,032	-402	12,635
14.9.2009	-28,187	-820	23,385
15.9.2009	-16,700	890	14,292
16.9.2009	-8,696	-118	7,304
17.9.2009	-42,063	-1,294	33,398
18.9.2009	-21,309	842	24,686
21.9.2009	-8,033	118	9,512
22.9.2009	-7,719	585	7,731
23.9.2009	-8,913	-1,014	7,328
24.9.2009	-25,240	-4,251	20,479
25.9.2009	-2,653	-485	2,742
28.9.2009	-4,101	51	4,364
29.9.2009	-2,668	295	3,015
30.9.2009	-6,492	578	4,540
1.10.2009	-6,311	-519	5,179
2.10.2009	-7,178	570	5,927
5.10.2009	-4,072	654	3,715
6.10.2009	-32,140	-2,122	24,996
7.10.2009	-5,455	74	6,497
8.10.2009	-3,191	581	3,198
9.10.2009	-18,775	657	14,926
12.10.2009	-31,464	-395	25,355
13.10.2009	-11,104	253	9,143
14.10.2009	-9,128	132	10,673
15.10.2009	-11,135	257	13,547
16.10.2009	-24,246	-156	20,015
19.10.2009	-39,458	1,260	31,774
20.10.2009	-21,110	-218	15,958
21.10.2009	-1,987	286	1,741
22.10.2009	-17,222	833	14,002
23.10.2009	-25,861	1,477	31,652
26.10.2009	-3,017	-241	3,612
27.10.2009	-1,901	-574	1,419
28.10.2009	-13,402	544	11,648
29.10.2009	-27,537	-1,020	22,559
30.10.2009	-16,665	2,211	14,136

## APPENDIX 2. Back-testing of the local bank

