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Exchange rate volatility and trade: the case of Ukraine

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ABSTRACT

This article demonstrates the assumptions of economic theory and its followers, the theories which stimulate research on the positive correlation between the success of the economy, its growth and the level of international trade. The empirical analysis of this paper examines the example of the exchange rate volatility and its influence on international trade on the basis of Ukraine. In the descriptive part of this study, which looks at the exchange rate volatility in Ukraine as a whole, the authors have aggregated the bilateral volatilities using trade shares as weights to obtain what is referred to as the “effective volatility” of the country’s exchange rates. It is summarized that the current situation in Ukraine is extremely difficult, and external financial support could alleviate the crisis. The time span used in the work includes the years from 1999 to 2014, with the help of which the authors have demonstrated the fluctuation and correlation between these two factors. From the graph it has been possible to make the conclusion that even if there was no significant visible correlation between trade and the exchange rate volatility, it does not mean that there is no relationship between these two factors, because there are a lot of factors which affect the level of trade.

Keywords: volatility; trade; exchange rate; transitional economies; international transactions.

1. Introduction

Currently the most traditional and the most advanced form of international economic relations is the international trade, which accounts for about 80 percent of the total volume of international economic relations. Today, international trade is the most important form of communication between producers from different countries, based on the emerging international division of labor, which expresses their mutual economic dependence, as well as the process of buying and selling which takes place between buyers, sellers and intermediaries in different countries. As a result, countries sign new economic agreements and conclude contracts. A relevant question which arises at this point refers to the analysis of a number of such criteria as the exchange rate volatility, different factors and indication of economic development.

For every country, the role of foreign trade is difficult to overestimate, as the economic success of any country in the world depends nowadays on foreign trade. Yet no country has managed to create a healthy economy, isolated from the world economic system and trade.

The authors of this paper examine in particular such criteria as the exchange rate volatility and consider the presence of correlation

with international trade. The study demonstrates the assumptions of economic theory and its followers, the theories which push forward to research the positive correlation between the success of the economy, its growth and the level of international trade. The consequences of the growth in the level of international trade and its effect on the division of revenue are not too visible. International trade, even being affected by different factors, shall have all intents and purposes to lead to a growth in the economy and the development of an economic system in the general and the overall welfare of a community.

In spite of the fact that there is much research and a number of theories, analyses and assumptions about the influence of the exchange rate volatility on the international trade, there is no prevailing convention about the value and heading of this influence. The indeterminacy of the empirical analysis might be the consequence of accepted complexities which are connected with modeling in econometrics. One of the problems could be caused by an indeterminate variable which is not included in the econometric modeling, and it is very frequent when they are not correlated with other illustrated variables. The next problem might be

caused by at least one or more undetermined variables which are not included in the econometric modeling. Also, the last issue is based on the correct form of the function of the correlations which are not known.

The empirical analysis of this paper examines the example the exchange rate volatility and its influence international trade on the basis of Ukraine. The time span used in the work includes the years from 1999 to 2014, with the help of which the authors have made a graph and demonstrated the fluctuation and correlation between these two factors. Thus, this paper seeks to investigate the presumptive effect of the exchange rate volatility on the international trade. The content of this paper is organized as follows: chapter one presents theoretical approaches by the traditional school, the risk portfolio school and some alternatives with their corresponding supporters. Chapter two examines the empirical analysis, where the description of the nominal exchange rate versus the real exchange rate is given. The authors subsequently suggest measuring the volatility, whereas in the last subchapter they demonstrate the empirical results of the relationship between the exchange rate volatility and trade by different scientists and authors. Chapter three proposes a significant example of the Ukrainian situation concerning its exchange rate volatility and its correlation with trade. Finally, the summary is given in the conclusion.

2. Analysis of recent research and publications

This paper reviews the literature that focuses on a variety of opinions which include Higgins, Klitgaard [2014], Porter [1990], Tenreiro [2007], Tielens, Van Aarle, Van Hove [2014]. The arguments presented in the paper suggest that the information within and across different studies can tell us a lot about a wide range of facts related to trade competitiveness and factors that force its movements. For instance, Porter [1990] in his work affirms that the competitive advantage of a country can be in terms of new technologies. As pointed out by Grilo and Koopman [2006], through its microeconomic factors (the same as a growth in international trade, an increase in productivity and labor cost), a country can improve the competitiveness aggregate. Belke, Schnabl, Zemanek, [2013] in their paper determined the following price and non-price indicators of an export growth: productivity efficiency; exchange rate; export to import ratio; price elasticity of export; technological innovations and specialization.

All the above mentioned opinions and studies were really substantial and informative; however, there is a lack of detailed economic and mathematical tools in an approach to the analysis of the exchange rate volatility and its impact on trade.

The purpose of the article is to research the dynamics of the exchange rate in Ukraine with the help of economic and mathematical tools in order to make visible some kinds of regularities, to realize future forecasts intentionally, to minimize losses and to ensure profitability of transactions, as well as to analyze such factors as export and import which are under the influence of the exchange rate in different economical periods.

3. The main material

A great deal of literature has been dedicated to this issue so far and there is still no consensus on the appropriate method for measuring the exchange rate volatility. The lack of agreements is the result of a number of factors. There is no generally accepted model of firm behavior that is subject to risk arising from fluctuations in exchange rates and other variables. As a result, theory cannot provide the definitive guidance to which measure it is more proper. Furthermore, the scope of the analysis will dictate to some extent the type of measure used. If advanced countries are surveyed, we should take into account the effect of forward markets for the assessment of the exchange rate volatility on trade, whereas this will not be possible if we extend our analysis also to a larger number of developing countries. Another feature of the exchange rate volatility that needs to be taken into account is the time horizon over which the variability is measured, as well as whether it is unconditional volatility or rather the unexpected movement in the exchange rate relative to its predicted value that is the relevant measure.

Finally, the level of aggregation of trade flows under analysis also plays a role in determining the most suitable measure of the exchange rate which is going to be used. Methodologically, the basic building block in the analysis is the volatility in the exchange rate between the currencies of each pair of countries in the sample, because it allows for the best control over a variety of factors other than volatility that could affect the trade. As a result, the change in detecting an impact of the exchange rate volatility on trade improves. The most significant question in the process of trade appears to be about the effect and influence of the exchange rate and the approaches in determining the measure of the exchange rate volatility. Côté lists

several of the most important considerations, including "...whether it should be bilateral or effective, real or nominal, and the appropriate way of measuring risk: short-run versus long-run horizon, ex ante versus export, sustained deviations from trend versus period-to-period movements."

There are two ways to measure the volatility of the exchange rate. In the first approach it is applicable to use the excess between the future exchange rate and the present-day exchange rate. The second approach consists in determining the standard deviation or it might be a variance of the degree of the exchange rate which must be either nominal or real. Unfortunately, there was no found approach for measuring the volatility of the exchange rate and the proclivity for the exchange rate to own the distorted volatility grouping, which was used in order to confute the simple method of theoretical statistical data for measuring the volatility of the exchange rate. Characteristic propensities of the statistical data referred to the financial temporal series, which are considered in the following part of the work.

It is very important to mention that a number of empirical analyses have highlighted the significance of decision making in the most effective measuring of the exchange rate volatility, not including the first designation of the differential between the two factors, i.e. between the expected and unexpected volatility. If we assume the parallel to the theory of the consumer, it is known that the expectations of consumers are an immaterial point, and that is why it has been confirmed in the case of trade on the international level, that the expectations of economic agents concerning the exchange rate volatility are the consequences which are expressed in the effect on the levels of international trade. Many scientists, including Farrell, have pointed out and highlighted the difference between the indeterminate and systematic movements of the exchange rate. If the traders could make a plan or forecast systematic alterations, the changes which are in reality indeterminate changes in a lot of cases, would designate the moves and shifts generated by the exchange rate volatility. Consequently, the majority of literature focuses not just on the way of measuring the volatility of the exchange rate but also on the way of predictive modeling.

For the descriptive part of this study, which looks at the general exchange rate volatility in Ukraine, it is necessary to aggregate bilateral volatilities, using trade shares as weights, to obtain what is referred to as the "effective volatility" of the country's exchange rates. This ensures that the measures of volatility in the

descriptive and econometric parts of the study are fully consistent. Such a measure of effective volatility presupposes that the exchange rate which an individual firm faces is the average of the variability of individual bilateral exchange rates [Lanyi, Suss, 1982]. However, if a trading firm engages in international transactions with a wide range of countries, any tendency for exchange rates are moved in opposite directions to offset the overall exposure of the firm to the exchange rate risk. This would justify the use of the volatility of the country's effective exchange rate as the measure of an exchange rate which the country faces. This method seems to be particularly suitable for developed economies, where most trade is undertaken by multinational corporations. It is also important to realize that the degree of the exchange rate variability to which a country is exposed, is not necessarily closely related to the type of an exchange rate regime, to which it has adapted. A country may peg its currency to an anchor currency but will float against the other currencies if the anchor does as well. Therefore, effective volatility means the same multidimensional concept as an effective exchange rate [Polak, 2002]. Pegging can reduce the nominal exchange rate volatility vis-à-vis one trading partner, but it can by no means eliminate the overall exchange rate variability.

This paper demonstrates the exchange rate volatility and its indicators of trade on the example of Ukraine. Concerning the current economic crises in Ukraine, the exchange rate is not stabilized. First of all, it is crucial to mention that the foreign exchange rates and currency parities are integral elements of the international monetary and financial system. Nowadays the monetary and financial systems in Ukraine are weakening. There is the multiplicity of factors that affect exchange rates, causing their fluctuations, which have a great influence on the activities (in particular an activity of trade) of foreign and domestic firms and companies. For example, a decrease in the exchange rate leads to the fact that the exporters in the exchange of profit in foreign currency during proceeding into the national currency start getting more profitability than before. Taking this into account, exporters are able to reduce the prices of their products on the global market, denominated in the foreign currency. This strengthens the competitiveness of the products on the global market, and thus contributes to the export of goods and services. Thus, there are numerous nuances which have an influence on the level of trade, including the country's level of government regulation and support of foreign currency. The following section examines the

currency exchange rate, annually over the time span encompassing the years from 1999 to 2014. Subsequently, the authors show the flow exports measured in US Dollars at current prices and current exchange rates in millions, the same as flow imports measured in US Dollars at current prices and current exchange rates in millions. Next, the authors analyze the net

Table 1: Currency Exchange Rate, annual 1999-2014

Years	Exchange rate of Hryvna to 1 USD
1999	4.1304
2000	5.4402
2001	5.3722
2002	5.3266
2003	5.3327
2004	5.3192
2005	5.1247
2006	5.0500
2007	5.0500
2008	5.2672
2009	7.7912
2010	7.9356
2011	7.9676
2012	7.9910
2013	7.9930
2014	11.9000

Note: The exchange rate ratio 1 dollar to the corresponding hryvna equivalent. Source: (adapted from) http://unctadstat.unctad.org/wds/ReportFolders/reportFolders.aspx?sCS_ChosenLang=entt.

export, calculate the coefficients of net export, and finally, they demonstrate a graph which reflects the situation concerning the exchange rate volatility and trade in Ukraine.

For the first step, there is a table below which describes the exchange rate of 1 dollar US to Hryvna.

On the basis of the above table it may be noted that from the year 2000 the exchange rate changed from 4.1304 Hryvna to 5.4402 Hryvna, after which there was stabilization of the currency. From 2009 the exchange rate increased from 5.2672 Hryvna to 7.7912 Hryvna. In 2014 year there was the highest level of the exchange rate, which amounted to 11.9 Hryvna.

For a better demonstration, in the following graph (below) of the correlation between the exchange rate volatility and trade it seemed

necessary to provide the balanced coefficients (from amount of Hryvnas in 1 USD) (to make all the values in the common unit of measurement).

The following formula will help in realizing the growth rate:

$(A2-A1)/A1$, where A1 – the previous year, A2 – the following year.

For the next step it is reasonable to demonstrate the trade indicators of export and import in Ukraine.

Table 2: Coefficient of Exchange Rate (fluctuations) and Flow Exports Measure

Years	Coefficient	Value of export, million US Dollar
1999	-	11582.0
2000	0.3171	14572.5
2001	-0.0125	16265.0
2002	-0.0085	17957.0
2003	0.0011	23066.8
2004	-0.0025	3266.1
2005	-0.0370	34228.4
2006	-0.0150	38368.0
2007	0.0000	49296.1
2008	0.0430	66954.4
2009	0.4792	39782.0
2010	0.0185	51478.0
2011	0.0040	68460.0
2012	0.00294	68530.0
2013	0.0003	64338.0
2014	0.4888	54199.0

Note: US Dollars at current prices and current exchange rates in millions

Source: (adapted from) http://unctadstat.unctad.org/wds/ReportFolders/reportFolders.aspx?sCS_ChosenLang=entt.

On the basis of the above table it is noticeable that the greatest value of export in millions US dollars during the last 16 years was marked in the year 2012, with 68530 million dollar US, after which the value of export started to decrease and reached 54199 million US dollars in 2014 year. Thus, it is visible that it was running low to the similar level of value as in the year 2010 where it was 51478 million US dollars.

The table below represents the values of flow imports measured in US Dollars at current prices and current exchange rates in millions in Ukraine.

Table 3: Flow Imports Measure

Years	Value of import, millions US Dollar
1999	11846
2000	13956
2001	15775
2002	16977
2003	23020.1
2004	28996.8
2005	36136.3
2006	45038.6
2007	60618
2008	85535.3
2009	45487
2010	60911
2011	82594
2012	84639
2013	76787
2014	54330

Note: US Dollars at current prices and current exchange rates in millions
 Source: (adapted from) http://unctadstat.unctad.org/wds/ReportFolders/reportFolders.aspx?sCS_ChosenLang=entt.

This table gives a view of the levels of value of import in Ukraine, with the lowest level of import falling on the year 1999 with the value 11846 million US Dollars, after which there was an observable increase in values of import. However, this tendency was just prior to 2009, with the value of 45487 million US Dollars. After 2009 there was a growth in the value of import but until 2013, after which there occurred a decrease and by 2014 it reached 54330 million US Dollars.

On the basis of the above mentioned, collected data the authors present the fluctuations of the exchange rate and growth rate of sum of exports and imports divided by the GDP values (Fig. 1).

Similarly to the previous graph, there is quite a similar situation here, with a relatively stable level of growth in the exchange rate from about 2000 to 2005. However, taking into consideration the historical background, it is possible to observe that at this time the so-called "stabilization" was made artificially by the National Bank of Ukraine, and consequently, there occurred a situation which was very similar to a "credit soap bubble". As a result of its collapse in 2007, the accumulation of negative

tendencies in the economy could be observed, which was expressed in the rapid decrease in the exchange rate growth. In 2008 – 2009 the growth in the exchange rate started increasing and reached 0.4792 (however on this graph it is impossible to evaluate the tendency of the sum of exports and imports divided by the value of the GDP (trade openness ratio) to see if it is positive or negative, in comparison with the other version of the calculations and defining of the correlation).

From these three graphs, which include different variables, it is possible to make the conclusion that if there is no determinant, visible correlation between trade and exchange rate volatility it does not mean that there is no relationship between these two factors. First of all, it is explained by a variety of causes which influence the exchange rate, and as a result influence the indicators of trade. Among the variety of different factors which are influential, there is the demand for exporting products, the level of demand on the domestic market, and the overall situation in the economy of the country. Insofar as different factors affect the level of trade, including the GDP rate, inflation, employment rate and others, which are not examined in this paper, it is impossible to deduce the determinant correlation between these two factors. However, in the literature it is proved that there is an existing relationship between the exchange rate volatility and trade, e.g. by the above mentioned scientists such as McKenzie and Brooks and Asseery and Peel [10]. In effect, the higher the exchange rate of the domestic currency, the lower the level of net export, because the parity of consumer's power becomes lower. Furthermore, the more stabilized the exchange rate of domestic currency is, the more stabilized the trend of export or import in the country is, depending on the focus of the country.

In Ukraine it is significant to mention the National Bank and its artificially restrained exchange rate of currency, which dramatically distort the real value of net export and the situation on the economic market in general. The National Bank of Ukraine artificially restrains the exchange rate of currency because it is not profitable when export dominates over import. This causes an increase in the exchange rate of Hryvna, which in turn might cause the default and lead to a collapse of the economy. In such a manner it is obvious that exchange rates have a significant impact on foreign trade in different countries, affecting the price ratios of exports and imports, causing a change in the domestic economic situation, as well as affecting the competitiveness of firms and profits of enter-

prises. Using the exchange rate, entrepreneurs compare their own cost of production to global market prices. This makes it possible to reveal the results of foreign trade operations of individual companies and the country as a whole. Sharp fluctuations in the exchange rate increase international economic instability, including monetary and financial relations, cause negative social and economic consequences, and the loss of some gains in other countries.

The situation which Ukraine has to face is the devaluation of the national currency, which makes it possible for exporters in this country to lower prices for their products in foreign currency, receive an award at the appreciated exchange proceeds of foreign currency to the cheapened national one, and sell products at prices lower than the world average prices. All this leads to their enrichment with at the expense of the material losses of the domestic country. But at the same time the depreciation of the national currency increases the cost of imports, as for the same amount in their currency foreign exporters are forced to raise prices, which stimulates their growth in the country, reduction of imported goods and the use or development of the national production of goods instead of imported ones.

In the case of Ukraine, the decline in the exchange rate reduces the real debt in the national currency and increases the severity of the external debt denominated in foreign currency. It becomes unprofitable to export the profits, interest, dividends received by foreign investors in the currency of the host countries. These profits are reinvested or used in order to purchase goods at domestic prices and their subsequent export.

Thus, it is possible to summarize that the current situation in Ukraine is extremely difficult, and external financial support could alleviate the crisis. Of course, entirely due to international financial resources there would be no possibility to solve the deep economic problems of the country. It would be very risky if Ukraine decides to live only at the expense of foreign support. It is very important as well as the attractiveness of Ukraine for the private capital. It is essential to have a look for representatives of international businesses that would like to invest in the development of the Ukrainian economy, insofar as the investors would inculcate the new equipment, technology, workplaces, and raise new export opportunities of the country.

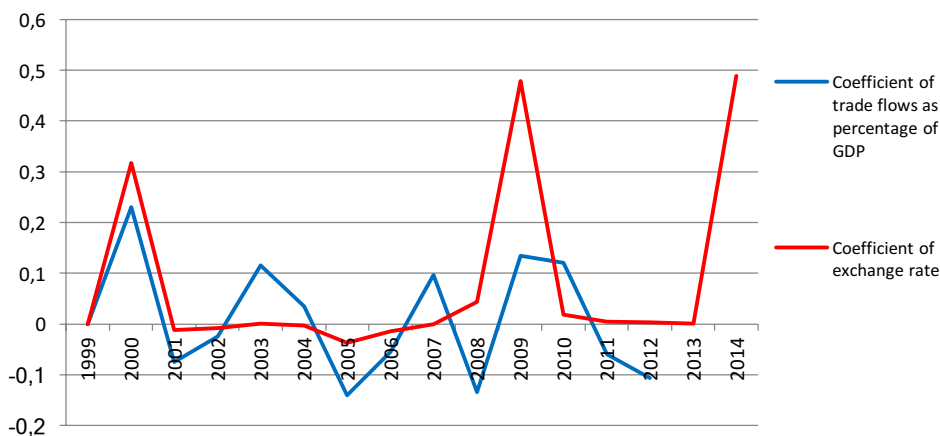


Figure 1. Fluctuation of Exchange Rate and Growth Rate of sum of exports and imports divided by values of GDP.

Note: In the graph the fluctuations of the coefficient of the exchange rate (of the amount of Hryvnas to 1USD) which go downward mean a positive tendency, and the upward movement means a negative trend

4. Conclusion

The authors of this paper have considered the question of the exchange rate volatility and its effect on trade. The analysis showed the theoretical base by the traditional school, the risk portfolio school and some alternatives. The followers of each of the abovementioned schools had various assumptions and theories; however, there is still no determinant convention concerning the value and direction of the influence of the exchange rate. This is caused by a variety of factors which can influence the trade; these factors include the level of gross domestic product, rate of inflation, the unemployment rate and others, not less significant factors. The authors have also analyzed the measuring volatility of the exchange rate and examined the fact that there are concerns by the economic agents about the usage of just the nominal exchange

rate in the short-run time period. It means that economical agents who are interested in co-operation in the long-run period of time need a real exchange rate. It stems from the fact that the nominal growth rate includes the inflation. And the real exchange rate reflects the growth in real product. It has been examined on the example of the Ukrainian exchange rate volatility and its influence on the trade. The time span used in the work includes the years from 1999 to 2014, with the help of which the authors have demonstrated the fluctuation and correlation between these two factors. From the graph it has been possible to make the conclusion that even if there was no significant visible correlation between trade and the exchange rate volatility, it does not mean that there is no relationship between these two factors, because there are a lot of factors which affect the level of trade.

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