EXPOSURE IDENTIFICATION AS A STEP OF A CURRENCY RISK MANAGEMENT UNDER CURRENT ECONOMIC INSTABILITY

ІДЕНТИФІКАЦІЯ ЕКСПОЗИЦІЇ ВАЛЮТНОГО РИЗИКУ ЯК ЕТАП РИЗИК-МЕНЕДЖМЕНТУ

In extreme global instability and external shocks, exchange rate volatility and currency risk exposures are among the primary issues for any international and domestic business entity. Moreover, currency risks nowadays have importance for Ukrainian enterprises for two reasons. Firstly, the war and foreseen post-war periods mean dramatic unpredictability and, therefore, the fragility of the economy overall and currency market as well because of various shocks at global and domestic markets, uncertain changes of macroeconomic fundamentals, mainly high inflation rates worldwide. Secondly, domestic companies need extra experience for effective managerial practices in a volatile environment, especially regarding currency risks. However, one can choose the most sufficient organisational tools only after correctly identifying exposures' roots, types, and characteristics, which is usually missing. Therefore, the paper aims to use a structural approach to ensure the correct identification of exposure to currency risk as a component of its assessment within goal-oriented management. Results include theoretical analysis of possible exposures to currency risk of the selected Ukrainian industries, namely the agricultural sector, food production, and defence. Practical implications aim at improving the effectiveness of currency risk management at domestic enterprises through correct analysis of the reasons and types of exposure.
Key words: *Foreign Exchange Rate, Exposure to Currency Risk, Currency Risk, Currency Risk Management, Cash Flows.*

Тривалий час серед багатьох науковців розповсюдженою була думка, що валютні ризики виникають виключно під час або в результаті здійснення зовнішньоекономічної діяльності, у зв'язку із використанням іноземних валют, курси яких часто є волатильними та непрогнозованими, і відповідно, не притаманні суб'єктам, не залученим до світової економіки. Проте, всеосяжні процеси глобалізації та інтернаціоналізації останніх десятиліть набули «вимушеного» характеру, що суттєво ускладнило економічні системи і зумовило високий рівень чутливості до волатильності валютних курсів не тільки суб'єктів міжнародної економічної діяльності, але і місцевих виробників, орієнтованих на локальний ринок. Для українських підприємств дана проблема набуває виключної актуальності з двох причин: по-перше, воєнний і післявоєнний періоди характеризуватимуться високим рівнем непередбачуваності і, отже, крихкістю економічної системи в цілому; по-друге, вітчизняні компанії все ще не імплементували найкращі управлінські практики, особливо в контексті управління валютними ризиками. Як наслідок, незважаючи на беззаперечне, на перший погляд, існування та важливість експозицій валютних ризиків, значна кількість суб'єктів господарювання не приділяє достатньої уваги даній проблемі ігноруючи аналіз валютних шоків, занижуючи її величину або статистичну значущість, обираючи некоректні методи управління, в тому числі у зв'язку із помилковою ідентифікацією джерел, сутності та типів експозиції валютного ризику. Відповідно, метою статті виступає використання структурного підходу для обгрунтованого визначення експозиції валютного ризику як необхідного етапу ефективного ризик-менеджменту. Результати дослідження передбачають теоретичний аналіз можливих експозицій валютних ризиків провідних галузей промисловості України, а саме аграрного сектору, виробництва харчових продуктів, військової та оборонної промисловості, згідно різних класифікацій та підходів з метою покращення управління валютними ризиками вітчизняних підприємств.
Ключові слова: *валютний курс, чутливість до валютного ризику, валютний ризик, управління валютними ризиками, грошові потоки.*

УДК 339.9

DOI: https://doi.org/10.32782/infrastruct72-3

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Formulation of the problem. Floating exchange rates pursue currency risk as one of the most critical for business, requiring careful management. Its importance is steadily increasing under periodical global shocks and extreme volatility. However, currency risk management faces some difficulties and may need higher efficiency. Firstly, a series of empirical tests described in the seminal paper by P. Jorion revealed economically small and statistically insignificant exposures; this mismatch was named afterwards a "puzzling weak relationship between exchange rates and returns" [5; 9]. Secondly, one often limits risk management to situational one and deals with the current unfavourable exchange rate changes or uses inappropriate management tools. One of the reasons for this inefficiency is a lack or incorrect understanding of the meaning, roots, and type of exposures to currency risk.

Analysis of recent research and publications. Initially it takes to distinguish two categories namely currency risk and exposure to currency risk (ECR). E. Von Pfeil defines ECR as vulnerability, uncertainty, potential risk to experience the impact of exchange rate fluctuations or incur losses, while currency risk isa probability, "cash flow destabilisation directly attributable to exchange rate movements" [23, p. 22–23].

The most general classification of exposures, mentioned in many papers, refers to translation, transaction, and economic ones. These types are widely known and well described A. Hakkarainen et al. [8], B.A. Ibrahim et al. [10], J.J. Pringle and R. Connolly [11], S.K. Lee and S.C. Jang [14], B. Mudiangombe and J.W.M. Mwamba [16], N. Hagelin [17], T.J. O'Brien [18], N. Pobrić [19], and M.M. Vivel-Búa, and L.-S. Rubén [22]. Nevertheless, E. von Pfeil states that this classification has little practical

meaning since it does not tell each exposure properly, namely its nature, characteristics, and reasons for appearing. Hence, it does not help to choose the most appropriate management tool [23]. That is why we take a closer look at other approaches to ECR using practical examples.

Formulation of the aim. The study aims to analyse various approaches to ECR identification, which is an essential step to effective currency risk management in the current unstable economic environment.

Presentation of the primary research material. There is a common belief that exposure to currency risk arises during or as a result of foreign economic activity because of foreign currency use, which is often volatile and unpredictable. Consequently, domestic entities dealing in the local market should be free of the issue. However, nowadays, any activity or operation is international, includes a foreign component, or is indirectly influenced by global markets or the actions of foreign parties through import-competing, international economic cycles in the goods and services, or financial markets [2; 5]. Consequently, ECR are inherent for all agents as soon as they start economic activity *per se*. From this point of view, exchange rate volatility can influence companies' cash flows *directly* or *indirectly*.

The first case means ECR itself, involving operational or financial hedging. The indirect case supposes *a combination of price and marginal currency risks*, requiring business management tools aimed at changing internal factors [23]. For example, the import price of a highly standardised commodity to a country will directly depend on its national currency fluctuations against the US dollar since the initial commodity price is set up at the world market. It is widespread for agricultural and food products. Division on International Trade and Commodities of UNCTAD investigated that during 2020-2022, import prices of winter wheat in some developing countries experienced a significant increase. However, 88% of its increment was conditioned by the world market price shocks due to the COVID-19 pandemic and the full-scale invasion of Ukraine by russia. In comparison, 18% to 88% of the increase was related to national currency devaluations, causing import price growth, inflationary pressure and food risks [1].

The opposite situation is typical for a noticeable but indirect relationship between exchange rates and cash flows because of the mutual correlation of prices and exchange rates, as well as the influence of other factors – supply and demand, information shocks, time, exceptional events, for example, the global financial crisis or possible global recession, seasonal component, inflation and its expectations [3; 20]. In particular, this is inherent for metals (gold, silver, platinum, palladium), fuel, and energy resources. Prices of its goods correlate with the US dollar rate, currencies of other developed countries, and commodity currencies of countries such as Australia, New Zealand, Canada, Chile, and South Africa [23; 24].

These indirect relations are becoming even more complicated under extreme current instability. International economics nowadays is facing dramatically new issues and processes over a few decades, namely an unprecedented increase in inflation because of supply chain disruptions and the aftereffects of russian invasion, significant interest rate growth almost in all countries and the consequent US dollar appreciation. Simultaneously, out-euro zone countries, such as Poland, Hungary and the Czech Republic, jointly with Ukraine, deal with deeper depreciation of national currencies due to global conditions and war pressure (Table 1). It led to using a fixed Hryvnia regime in February 2022. The Ukrainian economy accumulates shocks and imbalances that entail unpredictable foreign exchange rate fluctuations requiring ongoing currency risk management.

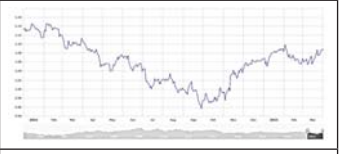
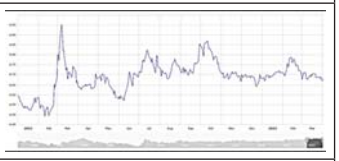
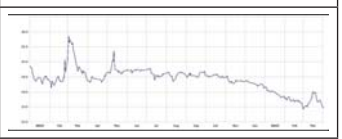
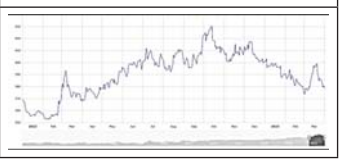
Type 1: explicit and implicit. At first glance, ECR is the object of pure attention of business entities engaged in foreign economic activity and direct economic interaction with foreign counterparties. In this case, the entities have to *convert the currency* or change the price according to the current exchange rate, resulting in an *explicit ECR*. The statement is valid for import payments, export earnings, raising foreign debt capital and its following servicing, foreign direct investment and income repatriation, participation in joint ventures abroad, and cross-border clusters. However, *widespread globalization* has made changes. Nowadays, more and more companies, even exclusively local ones, face it indirectly and deal with *implicit* ECR [23].

For instance, one of the domestic supermarket chains, Novus Ukraine LLC, imports specific milk and dairy products from Polish manufacturer Mlekpol Dairy Cooperative for further resale. In this case, an explicit ECR will occur since the price of goods directly depends on the current Hryvnia, Zloty, and Euro exchange rates. Moreover, exchange rates will also affect the final retail price for consumers: in case of a devaluation, the retailer will enhance prices to avoid losses, simultaneously creating an implicit exposure for the Ukrainian dairy industry representatives.

The European Union strongly supports agriculture under the Common Agricultural Policy of the European Union (EU CAP). It provides a wide range of subsidies, e.g., operating, agri-environmental, subsidies for organic production and less favoured areas, subsidies for rural development, the start of young farmers, their investments for the purchase or overhaul of machinery and equipment, for buildings or major renovation of buildings, subsidies for permanent grassland. By benefiting from the Policy, Polish producers have improved the quality of products per European sanitary standards, modernized production

Table 1

Selected exchange rates fluctuation

National currency	Min	Max	Average	Variation (Max- Min)	Oscillation, % (Variation / Average)	Dynamics
US dollar (USD)	0.9565 28 Sep 2022	1.1464 4 Feb 2022	1.0571	0.1899	17.96	
Polish zloty (PLN)	4.4921 10 Feb 2022	4.9525 7 Mar 2022	4.6906	0.4604	9.82	
Czech koruna (CZK)	23.426 1 Mar 2023)	25.866 2 Mar 2022	24.408	2.44	10.00	
Hungarian forint (HUF)	352.92 4 Febr 2022	430.65 13 Octr 2022	390.77	77.73	19.89	

Source: [7]

facilities, and can sell their products at low prices, even close to the cost [4]. Consequently, a Ukrainian consumer will likely choose the Polish "Łaciate" of 1 litter for 38 UAH [15] instead of the local Yagotynske 870 g for 42.95 UAH on average, leading to more robust price competition in the milk and dairy products market. Therefore, *price competition* will automatically cause a higher sensitivity of Milk Alliance, as one of the Ukrainian producers, to all pricing factors, where exchange rate volatility has one of the most prominent roles.

Type 2: long-term and short-term. E. Von Pfeil considers the division of the ECR based on the time criterion inappropriate since the management of short-term risks or cutting long-term into short-term rely on exchange rate forecasting. In case of an erroneous forecast, a company will recover situational damage instead of comprehensively analysing and identifying structural constraints that cause the sensitivity of cash flows to the exchange rate [23]. The false approach of dairy producers in 2023 is to change prices based on the Hryvnia rate forecasts, variating from 42.00 to 62.74 UAH/USD [21], instead of adapting the production strategy, minimising logistical risks, finding ways to reduce the cost and benefiting from temporary liberalisation trade with the EU, valid until 5.06.2023 and prolonged for a year.

Type 3: recurring and non-recurring or structural and non-structural [23]*.* The Turkish manufacturer of unmanned aerial vehicles (UAV) Baykar imported Ukrainian produced AI-450T engines to produce unmanned combat aerial vehicle (UCAV) Akıncı, AI-25TЛT and AI-322Ф engines for the Kizilelma Fighter UAV before the full-scale russian invasion of Ukraine. It caused *recurring exposures* for the company because of the volatility of the US dollar, Hryvnia, and Turkish lira. Furthermore, within the strategy of a deep military-technical partnership between Turkey and Ukraine, including exporting more than 500 Ukrainian engines in 2021-2030, recurring exposure would transform into a *structural* one, but only *in the case of permanent business models* [6].

However, the significant damage to the Motor Sich enterprise due to the shelling of Zaporizhzhia by russian S-300 missiles in November 2022 will practically bring stable production and logistics into a challenge. In this case, Baykar should reorient on the import of similar items *during a full-scale invasion*, for example, produced by the British manufacturer JCB, which forms a *non-recurring ECR*.

Moreover, Baykar actively uses artificial intelligence technologies (AI) for better object detection. For this aim, the enterprise can purchase a license with a lump sum payment to use a neural network of a *specific* architecture to process the collected graphic data from a developer in one of the leading countries in AI, such as France, Germany, Australia, or China. It will lead to *a one-off* exposure. However, the license agreement may require royalties over a certain period. The exposure will no longer be a one-off in that case, as it requests *a regular currency exchange*. There is one crucial threat in this case. The company's management can *incorrectly* consider exposure as non-recurring if

they ignore the frequency of the payments and focus on the current exchange rate of each transaction. It will create *dealing* exposure for Baykar, which the correct analysis could eliminate.

Vice versa, if the company considers the *regularity* of royalties and the associated exposures, Baykar is likely to select a Canadian licensor. The reason is Canadian dollars, which can serve the import of Rotax 912-iS engines produced by Bombardier Recreational Products Inc., already successfully involved in creating the tactical Unmanned Aerial Vehicle BAYRAKTAR TB-2 [6]. As a result, the exposures of royalty payments may transform into *recurring financial and structural* caused by Baykar's *short position* in the Canadian dollar. In turn, the company can offset it with the incoming cash flows in Canadian currency, mainly selling UAVs or individual components to Canada.

The production of improved UAVs, namely the Akıncı and the Kizilelma, which are under testing, forms an additional exposure for the company. Firstly, both "heavy" Bayraktars, compared to the first generation, require four times more powerful engines – 750 hp (560 kW) [6]. It was designed by Ukrainian Ivchenko-progress Design Bureau and manufactured by Motor Sich. The engine has become a *non-alternative* component for Baykar because of political reasons, technical characteristics, and price. Secondly, the *geographical concentration*, including a joint plant building in Ukraine, determines the production (impossibility or production process interruptions), financial (refusal to insure risks, new currency restrictions by the National Bank), logistical (failure or delay in supplies), and other threats. An alternative is an import or cooperation with foreign contractors. For instance, Baykar can purchase similar power turboprop engines from the Canadian manufacturer Pratt & Whitney. Notwithstanding, it will create a political risk for the company – dependence on foreign export licenses and the sanctions policy of developed countries, including the USA. As a result, Baykar's *reliance on one partner* will determine a *business-structural ECR until the end* of the russian-Ukrainian war.

Type 4: symmetric and asymmetric or linear and nonlinear. It is well-known that Ukraine, from the 2008/2009 marketing year until the full-scale invasion of russia, was the leader in producing and exporting oilseeds and sunflower oil, providing about half of the world's supply. As a net exporter, the oil industry benefited from the weak hryvnia, which began to fall in 2014 and suffered from the strong currency observed in 2019. Consequently, one of the world's biggest producers Kernel-Trade LLC is likely to use financial hedging against Hryvnia revaluation, ignoring the risks associated with devaluation. Such asymmetric hedging can significantly underestimate the overall ECR and demotivate companies to imply comprehensive risk management (Table 2).

Another case refers to the post-war period. Apparently, Ukraine will lose a prominent part of the market share, and it is risky to become a net importer of sunflower oil in the nearest years because of the russian invasion, the Back Sea blockade, and the

Table 2

Reasons of asymmetric ECR

Group	Factor	Essence
Corporate behaviour	Asymmetric hedging	use of financial hedging instruments (forwards, options, swaps) only against adverse exchange rate changes: – net importers, holders of a net short position in foreign currency or a net long position in national currency hedge against devaluation only; – net exporters, holders of a net long position in foreign currency or a net short position in national currency, hedge against revaluation only;
	Pricing-to-market	export price adjustment: – to maintain or increase market share; – depending on the level and type of competition; – due to quantitative constraints: governmental (quotas) or corporate (capacity – constraints, marketing investments);
	Hysteretic behaviour	devaluation encourages competitors to enter the market, however, revaluation does not lead to exit from it, even with operating losses due to high entry and/or sunk costs,
Industry characteristics	– not tradable goods or services; – a priori high sunk costs; – a priori oligopolistic competition in the industry; – export orientation of industries;	
Methodology and model misspecifications	– focus on linear/symmetric exposures while ignoring possible non-linear/asymmetric ones; – aggregated data instead of firm-level; – short-term analysis instead of long-term; – missing the hedging result, whether operating or financial; – the efficient market hypothesis breaking and mispricing; – error terms and biased test statistics due to the conditional heteroskedasticity.	

Source: [9; 13]

permanent shooting of physical facilities, including critical infrastructure. Since the world production and export of sunflower oil are concentrated in country terms, Ukrainian producers should clearly identify their aim while re-entering the world market – whether they choose profit maximization or market share recovery. Regarding market share choice, Kernel-Trade LLC will also face asymmetric ECR.

Contrary to described shreds of evidence where asymmetric ECR are caused by Kernel-Trade LLC management decisions, some cases appear naturally and independently. For instance, it is typical for industries with high sunk costs (pharmaceutical, aircraft building, mobile services) or oligopolistic markets. Therefore, a company needs a comprehensive analysis of the types and roots of each ECR to manage it properly and effectively.

Conclusions. Under favourable external conditions, namely high prices at the world market, Kernel-Trade LLC can successfully use only operational or financial hedging for sunflower oil export operations. However, in case of a downward price trend for raw materials or robust competition from soybean or palm oil in the global vegetable oil market, usual hedging will be ineffective because the reason for sensitivity to exchange rates relates to characteristics of exported goods rather than to currency volatility itself. That is why the primary tool of risk management of Kernel-Trade LLC is diversification and orientation on high value-added products but hedging against unfavourable exchange rates. One of the ways is to increase the export of refined or bottled oil. It will bring greater flexibility for Ukrainian producers during shocks and better financial stability.

The reason for Baykar's sensitivity to exchange rates is its short position in the Canadian dollar during exporting Rotax 912-iS engines produced by Bombardier Recreational Products Inc. One possible way to eliminate the ECR is to create inflow in Canadian dollar or import engines from a country with suitable currency policy and stability.

Obviously, effective currency risk management is crucial for domestic enterprises in the face of the dramatic instability of post-war recovery. That is why one could only make these conclusions by adequately investigating the roots of sensitivity to exchange rates and ECR types. The further step of the research is to evaluate ECR of sunflower oil producers and identify the most effective treatment.

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