THE IMPACT OF POLAND'S EMU ACCESSION ON FOREIGN TRADE

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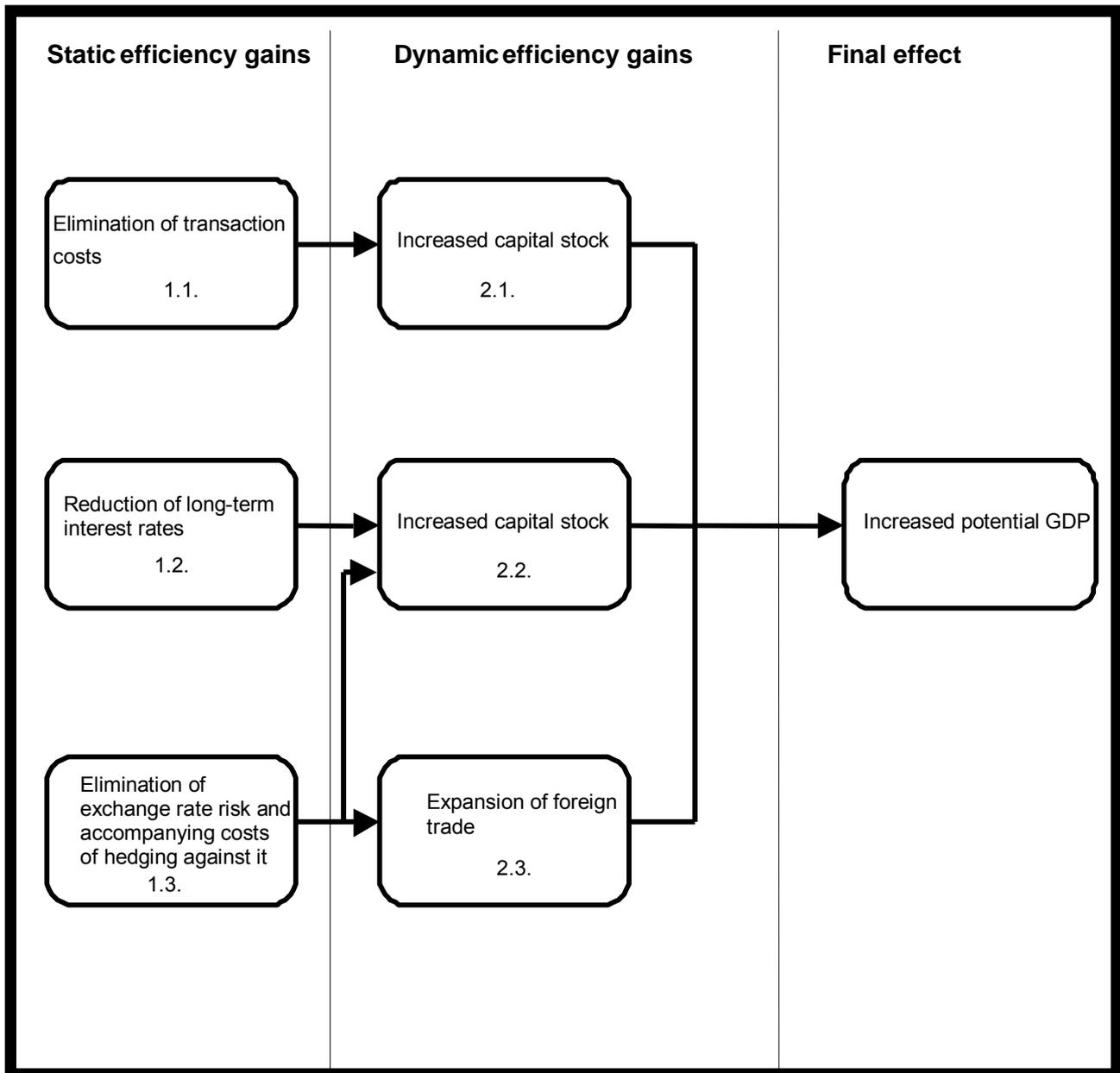**JEL classification:** E24, E42, J31

INTRODUCTION

A precise (as much as possible) assessment of macroeconomic benefits of Poland's EMU accession should be one of the components of the Polish debate on the time-table and economic consequences of this process. Such assessment is less dependent on one-time benefits, such as possible rise in seingniorage [Tymoczko, 2001], or benefits whose quantitative assessment does not seem feasible (e.g. enhanced credibility of an antiinflationary policy due to the importation of external credibility). Far more importance ought to be attached to the benefits connected with the establishment of a common currency area which are long-term and have a direct, quantitatively analysable impact on the economies participating in a common currency area.

In accordance with the theory of monetary integration there are three areas of benefits connected with the introduction of a common currency (fig. 1). Firstly, transaction costs are reduced, namely the costs connected with the necessity to exchange foreign currency (foreign currencies) for national currency and *vice versa* (1.1). Secondly, the elimination of exchange rate volatility versus the reference currency (i.e. the currency which will replace the domestic currency) implies the reduction of exchange rate risk premium incorporated in long-term interest rates, thus bringing them down (1.2). Thirdly, a common currency means that the bilateral rate of exchange ceases to exist. There is thus no more uncertainty as to the future evolution of the rate and, furthermore, the costs of hedging against exchange rate risk to households and enterprises are reduced (1.3).

The above-mentioned benefits represent efficiency gains which are *static* [Baldwin, 1991]. The funds so far spent by enterprises on the coverage of transaction costs, exchange rate risk hedging and capital can now be reallocated to the production of goods and services. This means that they generate a one-off rise in total factor productivity. However, from the viewpoint of monetary integration *dynamic* efficiency gains are what matters, these being long-term processes triggered by the emergence of static benefits [EC Commission, 1990]. And thus in accordance with the neoclassical model of economic growth [Solow, 1956] lower transaction costs, lower exchange rate hedging costs and lower interest rates can be expected to fuel additional capital accumulation, leading to increase of capital and stock and GDP *per capita* in a steady

state (2.1 and 2.2). Moreover, uncertainty as to the level of the exchange rate and, consequently, future profits of the firms engaged in the foreign trade, inhibits trade between countries with no common currency. The elimination of such uncertainty leads to an intensification of trade (2.3) and, together with falling cost of capital (conducive to its accumulation), fosters long-run GDP *per capita* growth.

Fig 1. Static and dynamic efficiency gains from monetary integration

Static efficiency gains	Dynamic efficiency gains	Final effect
Elimination of transaction costs 1.1.	Increased capital stock 2.1.	
Reduction of long-term interest rates 1.2.	Increased capital stock 2.2.	Increased potential GDP
Elimination of exchange rate risk and accompanying costs of hedging against it 1.3.	Expansion of foreign trade 2.3.	

The purpose of this paper is to assess long-term consequences of Poland's EMU accession for the volume of trade between Poland and the euro area. This analysis will

thus leave out the remaining channels through which single currency exerts an impact on the level of economic activity. Section one of the paper presents the theoretical aspects of the consequences for foreign trade resulting from uncertainty as to the future exchange rate. Section two discusses the results of related empirical research. Section three is devoted to zloty exchange rate volatility observed in 1994-2002 and the its possible impact on foreign trade development. In particular, an attempt is made to answer the question if and to what extent zloty floatation may have contributed to limiting Poland's foreign trade with the euro area. Moreover, this section presents the assessment of EMU accession's potential impact on the level of foreign trade between Poland and EMU countries. The summary presents the main conclusions.

I.   EXCHANGE RATE RISK AND INTERNATIONAL TRADE

The exchange rate is the basic variable determining profits of enterprises participating in international trade, in short- as well as in the long-term. Due to a lag between the conclusion of a trade contract and its settlement, tantamount to the possibility of exchange rate movements during such period, the profits expected at the moment of contract implementation can significantly diverge from the actually realised profits. Assuming that economic agents are risk-aversed, the utility function of a firm can be written as [Hooper, Kohlhagen; 1978]:

$$U = E(\pi) - \gamma \cdot \sigma_{\pi},$$

where: $E(\pi)$ - expected firm's profit,

γ - risk aversion co-efficient,

σ_{π} - standard deviation of firm's profit.

Utility of an enterprise is thus an increasing function of expected profit and decreasing function of the risk aversion and volatility of an firm's profit around the expected value. It can be assumed that economic agents maximise thus defined utility function and, moreover, the cost and revenue stream denominated in foreign currency is not fully hedged against adverse changes of the exchange rate. It can be demonstrated that a

rise in exchange rate uncertainty (rise in exchange rate risk)[1] negatively affects the trade volume[2] and positively (negatively) affects the prices if the exporter (importer) bears the exchange rate risk.

The volatility of profits caused directly by exchange rate fluctuations is not the only source of uncertainty that inhibits expansion of trade. Propensity to engage in foreign trade is also reduced by the adjustment costs incurred by enterprises as a result of exchange rate deviations from the value expected by them at the moment of taking investment decisions necessary to implement a trade contract in the future [International Monetary Fund, 1984]. These costs are connected with the expansion and reduction of production capacity in periods of a favourable (unfavourable) exchange rate. Uncertainty as to the magnitude of these costs (determining enterprise profits) may prompt tradable sector enteprises to scrap their businesses and move the available resources to the non-tradable sector. Such reallocation of resources from the sector open to international competition, stimulating technical progress, to the sector displaying less competitive pressure leads to decreased pressure on innovation in the economy, lower growth rate in productivity and potential GDP. This is reflected in empirical research pointing to a favourable impact of foreign trade and openness of the economy on the level of *per capita* GDP [Frankel, Romer; 1999].

Critical to a discussion on the impact of exchange rate risk on foreign trade is the way of defining such risk. The first thing to determine is to what extent the assessment of such risk should be based on the movements of the nominal exchange rate and to what extent on real exchange rate volatility. It seems that movements of the nominal exchange rate (implying changes of the real exchange rate) are crucially important to export and import payments, usually carried out some time after the conclusion of transactions. In turn, critical to assessment of the impact of exchange rate risk on a

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[1] Perée i Steinherr [1989] propose to distinguish <u>short-term</u> *exchange rate risk* from uncertainty as to the evolution of the exchange rate in a <u>distant future</u> (*exchange rate uncertainty*). In the short term the volatility of the nominal exchange rate is subject to quantification and forecasts, which justifies the use of the term "risk" with respect to changes in the exchange rate within a not too distant time horizon. However, in the long-term horizon the possibility of forecasting the expected level of the exchange rate and assessing its attendant risk is considerably limited. This would warrant the use of the term „uncertainty" with reference to the prospects of long-term evolution of the exchange rate. For simplicity, further in this text both terms will be used interchangeably with an indication what period they refer to.

propensity to conclude long-term trade contracts (which mostly imply the necessity to implement longer-term investment contracts) are changes in the real exchange rate, which is most appropriate for assessing price competitiveness of the tradable sector (e.g. with unit labour costs as the deflator). Secondly, the selection between the nominal and real exchange rate should partly follow from the availability of exchange rate risk hedging instruments (providing mostly a hedge against a short-term exchange rate risk) and an extent to which they are applied by traders. In an environment in which enterprises commonly use these transactions, more emphasis should be placed on movements in the real exchange rate. Thirdly, it is extremely hard to decide to what extent the *ex post* observed volatility of the nominal and real exchange rate can be used as a measure of exchange rate uncertainty and to what extent one ought to rely on *ex ante* risk measures. In the latter case the deviation of the forward rate from the market rate observed at the time of contract implementation could be used as a measure of short-term exchange rate risk. In turn, the observed deviations of the real rate from the long-term trend or, ideally, long-term equilibrium rate could serve as a measure of *ex ante* medium or longer-term uncertainty. However, such treatment of uncertainty is connected with the necessity to estimate the long-term equilibrium exchange rate, which (in view of various definitions of such category) considerably hinders the measuring of thus specified exchange rate risk [European Central Bank, 2002]. Fourthly, one should decide to what extent the measures of uncertainty should take into account the evolution of bilateral exchange rates and to what extent effective exchange rates should be used. There is no doubt that in assessing the impact of exchange rate risk on the total volume of foreign trade the effective exchange rate should be considered. On the other hand, using the volatility of the bilateral exchange rate seems most appropriate for assessing the consequences of replacing domestic currency with foreign currency for the intensity of trade between two economies (which is the subject-matter of this study). The assessment must be accompanied by an *implicit* assumption that the elimination of bilateral exchange rate risk will not be accompanied by a growth of uncertainty as to the rate of the common currency with respect to third countries, which would restrain trade

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[2] Perée i Steinherr [1989] when analysing the impact of exchange rate risk on the volume of an exporter's output demonstrate that if the risk aversion co-efficient in the utility function of an enterprise is left out there persists a negative impact of the enterprise's profit volatility on export volume.

with countries not participating in the monetary union [Calmfors Commission, 1997; Obstfeld, 1997].

II. EXCHANGE RATE RISK AND FOREIGN TRADE IN THE LIGHT OF EMPIRICAL RESEARCH

The above postulated theoretical and negative correlation between exchange rate risk and trade intensity was discussed in many empirical studies. It is worth to quote, at this juncture, the results of studies conducted after the collapse of the Bretton Woods system. Their scope covered both the period of relative stability in forex markets in the run-up to collapse of the system and in the following years. This was justified by the fact that in the period after USD floatation a significant growth of exchange rate volatility could be observed, which might have had a negative impact on the volume of trade between the countries under analysis.

In one of the most comprehensive analyses of the exchange rate risk impact on the volume of trade Hooper and Kohlhagen [1978], using the above-presented firm's utility function, propose a theoretical model of equilibrium on market for tradable goods, specifying the export supply and import demand functions. Subsequently, they estimate the reduced form of the model, in which the variable illustrating exchange rate uncertainty explains trade volume. Using time series for 1965-1975 the authors estimate parameters of sixteen equations explaining bilateral trade (separately exports and imports) between the US and Germany, and, respectively, France, Japan, Canada and the UK. The quarterly average difference between the spot and forward exchange rate of three months before was used as a measure of exchange rate risk. Only in one case (US exports to the UK) a statistically significant and negative impact of the exchange rate uncertainty on the level of trade was observed. The results remained unchanged despite various methods of estimation and adopting other definitions of exchange rate risk (variance of the spot rate, variance of the forward rate, moving averages of each of the three variables with different lags). Similar conclusions were arrived at by a comprehensive analysis conducted by the International Monetary Fund [1984]. It used a simple model of world trade taking the level of the world GDP and the weighted average variance of quarterly real effective exchange rate (REER) in seven developed

economies as explanatory variables with various lags. The co-efficients thus achieved proved statistically insignificant and positive.

Kenen and Rodrik [1986] questioned the results of the hitherto empirical research by pointing to a statistically significant and negative impact of the short-term volatility of REER on the imports of eleven countries under analysis. They took the standard deviation of monthly % change in REER calculated, respectively, for 12 and 24 months preceding the quarter for which such deviation was determined as the variable illustrating the level of exchange rate risk. The study was conducted for the years 1975-1984. In the case of four out of the eleven countries under analysis a statistically significant and negative impact of one of the measures of volatility of REER on import volume was determined. The hypothesis on the adverse impact of uncertainty connected with the evolution of the exchange rate found an even stronger confirmation in the results of empirical studies conducted by De Grauwe [1987] for ten OECD countries. He estimated the parameters of a structural model in which the rate of bilateral export growth was explained among others by the y/y growth rate of the importer's GDP, y/y growth rate of REER and the variable determining the level of exchange rate risk. The latter was defined as the variance of y/y changes in the bilateral real exchange rate. The estimator determining the impact of this variable on export volume proved negative and statistically significant.

One of the most interesting approaches to the problems of exchange rate uncertainty was suggested by Perée and Steinherr [1989]. They (stronger than that it had been done before) accentuated the possibility of hedging against short-term exchange rate risk. They focused on the medium-term exchange rate uncertainty, adopting the concept of the long-term equilibrium exchange rate. The first of the indices was the sum of the amplitude of the nominal rate fluctuations recorded in a given period and the deviations of the nominal rate from the long-term equilibrium rate. The latter was determined on the basis of purchasing power parity (for the period in which the Bretton Woods system was in force) or the Williamson approach [1985]. The second index was the product of the sum of modules of deviations of the nominal rate from the equilibrium exchange rate in the period of ten years and the sum of these deviations in the period of five years. The length of reference periods selected for both indices described how strong the "decay of memory" was, i.e. how distant-in-time fluctuations of the exchange rate and its deviations from the long-term equilibrium rate might reflect the

exchange rate risk perceived by enterprises. The above mentioned measures of exchange rate uncertainty were used in the model explaining changes in export volume (total or exports to the US). Apart from exchange rate uncertainty indices, world trade volume, real exchange rate and changes in *terms of trade* were used as explanatory variables. The model was estimated on y/y data for 1960-1985, which included export volumes for the USA, Japan, UK, Germany and Belgium. In most cases the adopted measures of exchange rate uncertainty had a statistically significant and negative impact on export volume. This impact was also found by Bini-Smaghi [1990] who performed estimation for the modified Hooper-Kohlhagen model for the manufacturing sector exports of Italy, Germany and France to the remaining countries participating in the European Monetary System in 1976-1984. The quarterly standard deviation of weekly change in the effective exchange rate versus the remaining EMS countries was taken in that study as a measure of exchange rate risk.

The impact of exchange rate risk on international trade was also assessed by Rose [2000]. Using a panel regression for 186 countries he estimated the gravity model of trade in which the standard deviation of monthly changes in the logarithm of the bilateral exchange rate over the period of five years preceding the year of estimation was taken as a measure of exchange rate risk. The variable had a statistically significant and negative impact on the volume of bilateral trade between the countries under analysis.

The above presented empirical findings lead to the following conclusions. Firstly, they do not allow to uniquely falsify or uphold the hypothesis on the negative impact of exchange rate risk on the volume of international trade. This results first of all from varying specifications of the models produced by the authors, varying structures of lags, different samples of countries, different time series and attempts to measure exchange rate fluctuations under different exchange rate regimes. Secondly, in the literature on testing the negative effects of exchange rate volatility for international trade no consensus has been achieved as to which exchange rate measures properly reflect the risk which exporters and importers have to face on a day-to-day basis. In particular, the fundamental issue pertains to the choice between short-term fluctuations of the nominal rate and measures illustrating the scale and duration of the real exchange rate deviation from the long-term equilibrium level. Thirdly, the literature lacks consensus as to the scale of hedging against exchange rate risk. So long as this scale cannot be precisely

defined, the unique identification of a single exchange risk measure as most adequate will not be possible.

The above conclusions have also been reflected in the discussion on the benefits which can be associated with EU and EMU membership. In its comprehensive analysis of costs and benefits of monetary integration the European Commission [1990] found that given the lack of unique results of empirical studies it was not possible to estimate the impact of the introduction of the single European currency on the level of trade between the countries participating in the monetary union. The Calmfors Commission [1997], whose task was to estimate the possible benefits of Sweden's EMU accession, came to the conclusion that (in view of empirical results) exchange rate fluctuations did not impact or had little impact on the volume of foreign trade. Obstfeld [1997] adduces results of empirical research pointing to a negative and not very big impact of exchange rate volatility on foreign trade, stating at the same time that a quantification of benefits connected with the introduction of a common currency is difficult, to say the least, if at all possible. A similar conclusion is drawn by Wyplosz [1997], when he states that researchers' attempts to quantitatively analyse benefits stemming from monetary integration are "frustrating and useless". However, irrespective of the skepticism shared by economists with respect to the possibility of finding unambiguous negative impact of exchange rate risk on a propensity to trade, this impact was and is *implicitly* recognised in decisions of macroeconomic policy-makers in many countries. For instance, the stimulation of trade and growth by constraining the volatility of bilateral exchange rates was the main reason behind the setting up of the European Monetary System in 1979 [De Grauwe, 1987][3]. In turn, Calvo and Reinhart [2000] argue that the purpose of the "softening" (as empirically proved by them) of the floating exchange rate in emerging market countries by discretional interest rate and forex intervention policies, is to limit exchange rate fluctuations and their negative consequences for foreign trade. The reason is that foreign trade is usually denominated in foreign currency, which imposes exchange rate risk on domestic parties. Moreover, financial markets (which provide the hedging instruments at a relatively low cost) are underdeveloped in those countries, which reinforces the need to smooth out domestic currency volatility.

III.   IMPACT OF POLAND'S EMU ACCESSION ON ITS EUROZONE TRADE

A decision to introduce a floating exchange rate regime, safeguarding the autonomy of antiinflationary monetary policy, is usually connected with the risk of increasing volatility of the exchange rate. Once the exchange rate has been floated, an increasing role is played by expectations of forex players, who constitute a factor in the short and medium-term evolution of the exchange rate. In view of the above-discussed theoretical (but partly empirically confirmed) relationship between exchange rate volatility and propensity to engage in foreign trade, it can be expected that the introduction of a floating rate (indispensable as it is due to the necessity of ensuring monetary autonomy given the freedom of capital movements) has negatively affected Poland's trade with the euro area. In this context three questions should be formulated. Firstly, has the rising role of market forces in the process of zloty exchange rate evolution resulted in a rise of zloty rate volatility? Secondly, to what extent might a possible growth of its volatility have contributed to restraining trade with the euro area? Thirdly, what can be the impact of the introduction of the euro in Poland on such trade? It is noteworthy in this context that the analysis of zloty market rate fluctuations both before and after the introduction of a floating regime should be conducted both in terms of measures of short-term nominal exchange volatility and the volatility observed in the medium-term, understood as deviations of the zloty REER from the long-term equilibrium rate.

Assuming that the standard period for settling an export and import contract is three months, the measure of short-term exchange rate volatility was taken to be the 12-month moving standard deviation of 3-month change in the PLN/EUR rate and of the nominal effective exchange rate (fig. 1 in the annex). Focus on the pace of change in the nominal exchange rate rather than on its levels resulted from the character of the exchange rate regime which was in force prior to zloty floatation (crawling peg and subsequently crawling band being systematically widened). In turn, the choice of the 12-month reference period is identical with the assumption that the above-mentioned

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[3] Empirical studies demonstrate that in the initial period of system operation the volatility of exchange rates in EMS countries became significantly constrained [Ungerer *et al.*, 1986].

"decay of memory" occurs after a year from an observed case of exchange rate volatility. The analysis was restricted to the years 1995-2002 to avoid distortions of thus constructed index resulting from a one-time steep devaluation of the zloty versus the basket of currencies, which occurred in August 1993.

The data presented above allow for the following conclusions. First of all, since early 1998 a systematically growing trend can be observed in the short-term volatility of the zloty. The process (initiated in 1998) of systematic relaxation of Poland's exchange rate regime was thus connected with a rise of short-term exchange rate fluctuations. Secondly, a systematic growth in exchange rate volatility can be observed in the case of the exchange rate of the zloty both against the euro and the nominal effective exchange rate. This means that the movements in the euro (D-mark)/dollar cross-rates observed at the same time were not the only reason for the rising volatility of the nominal zloty exchange rate versus the euro.

The second measure of short-term exchange rate risk can be provided by the deviations, observed in recent years, of the forward exchange rate from the spot rate recorded on the settlement date of a forward transaction (fig. 2). Assuming that a three-monthly period of contract settlement is most appropriate in terms of the time profile of payments made by the importer and received by the exporter, it can be said that in the years 1999-2002 a considerable disparity between both rates persisted. There is no doubt that it was much bigger than in the period of crawling peg system, which implied a high likelihood of a given forward rate being close to the relevant spot rate in the future.

It is advisable to verify the above findings based on the available measures of REER in the medium term which take account of deviations of the real exchange rate from the long-term equilibrium rate. Rubaszek [2002] presents estimates of the zloty equilibrium rate determined according to the FEER methodology (Fundamental Equilibrium Exchange Rate) proposed by Williamson [1985] and BEER methodology (Behavioral Equilibrium Exchange Rate). But neither of these measures provides a unique response to the question about the impact of introducing a floating exchange rate regime on the medium-term volatility of the zloty rate. The reason is that significant deviations of the zloty REER (unit labour costs as the deflator) from the equilibrium rate calculated in accordance with the FEER methodology are observable throughout the whole period under analysis (1995-2002). On many occasions these deviations

changed their sign, but their scale has not undergone significant change. In the most recent period the exchange rate even approximated the equilibrium level. In turn, the equilibrium level calculated in accordance with the BEER methodology (changes in relative productivity, changes in *terms of trade* and relative level of budget deficit as explanatory variables) with the use of the CPI as the deflator is strongly dependent on the domestic inflation level (containing important components which have little impact or are neutral in terms of price competitiveness of the tradable sector). For precisely these reasons thus defined volatility of REER cannot be the basis for conclusions about the impact of zloty floatation on its medium-term volatility.

A way to bypass the above limitations is to analyze the deviations of the zloty REER (producer prices in the manufacturing sector as the deflator) from the long-term trend. The trend has been determined with the use of the Hodrick-Prescott filter (fig. 3). The data demonstrate that the relaxation of Poland's exchange rate regime has contributed to a slight growth of the amplitude of REER around the values resulting from the long-term trend. However, in contradiction to the short-term volatility of the zloty rate, a noticeable growth of the amplitude of exchange rate fluctuations occurred only in the years 2001-2002, i.e. after the actual floatation of the zloty exchange rate.

In the context of the above findings a question arises about the impact of the rise in zloty volatility in recent years on the level of Poland's foreign trade with the euro area. In this analysis it is worth focusing on short-term exchange rate risk, by assessing the consequences of its increase both in qualitative and in quantitative terms. As part of a qualitative analysis it is worth noting that even a significant rise in short-term exchange risk should have no major impact on the propensity to trade, if the future flows denominated in the foreign currency are fully hedged. However, it follows from available survey results [National Bank of Poland, 2002] that 71% of enterprises which have foreign currency denominated liabilities and which perceive the exchange rate risk do not hedge against it. At the same time, over a half of all surveyed enterprises are companies "unaffected" by exchange rate risk. One can expect that a majority of these enterprises do not hedge against exchange rate risk either. Although the survey focused on exchange rate risk hedging motivated by firm's liabilities denominated in foreign currencies, one can expect that the behaviour of Polish exporters and importers is similar in this regard. This would point to a negative impact of rising exchange rate risk (as observed in recent years) on Poland's foreign trade with the euro area.

A quantitative analysis can be conducted with the use of an exchange rate risk illustrating variable proposed by Rose [2000] and defined as a five year standard deviation of monthly change in the logarithm of bilateral exchange rate (PLN/EUR in this case). An unquestionable advantage of this measure is that its impact on trade was estimated with the use of a panel regression with a considerable number of observations (22948). The data presented in the annex (fig. 4) demonstrate that in the period from September 1998 (first value of the index which is not distorted by a one-off steep devaluation of zloty in August 1993) until August 2002 the standard deviation rose by one percentage point to 2,7% (up from 1.7%). That period has been associated with a gradual but steady relaxation of exchange rate regime in Poland with the NBP's simultaneously and consistently refraining from intervention in the forex market. On the basis of the results of Rose's estimation it can be assumed that the growth of exchange rate risk observed at the time has contributed, other things equal, to a 1.7% decrease in trade volume between Poland and the euro area.

The above analysis constitutes merely a point of departure for assessing a possible impact of Poland's future EMU accession on the volume of trade between the two economies. The qualitative element of such analysis should take into account the benefits connected with the asymmetric impact of short-term interest rate disparity on the propensity of firms to hedge against exchange rate risk. In the light of the theory of natural rate of interest [Brzoza-Brzezina, 2002; Borowski, Brzoza-Brzezina 2002] it can be expected that the disparity of short-term interest rates in Poland and euro area will be maintained until Poland's EMU accession. The disparity implies favourable (unfavorable) forward exchange rate for exporters (importers), thus constituting a factor discouraging businesses from involvement in import transactions. Moreover, the existing formal and legal conditions result in a situation that a purchase of foreign currency in a forward transaction under an interest rate disparity which is open "to Poland's disadvantage" generates cost which additionally discourages enterprises from concluding such transactions[4]. Such obstacles will be set aside once the euro has been introduced in Poland, which should contribute to increasing businesses' propensity to trade with EMU countries.

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[4] I would like to thank Professor Andrzej Sławiński for bringing this issue to my attention.

However, it is the quantitative analysis that is fundamentally important in view of the impact of the common currency on the volume of imports and exports. Given the fact that the 5-year average monthly change in the logarithm of the monthly average zloty rate vs. the euro in August 2002 was close to zero (0.16%), it can be assumed that the total impact of the elimination of exchange rate volatility as of EMU accession will be effected by way of bringing the standard deviation (2.7%) down to zero. This would mean that in the long run EMU accession may be expected to result in a 4.7% growth of trade between Poland and EMU. However, the impact of euro adoption on the volume of exports and imports between Poland and the euro area can be much bigger than it would follow from a potential fall in the volatility of the nominal exchange rate. In the estimated gravity model Rose introduced a dummy for countries with a common currency. The results of estimation were striking: having a common currency contributes to an over threefold (!) long-term growth in bilateral trade. Such considerable impact of establishing a common currency area is most likely connected with leaving out other measures of exchange rate risk than the one employed by Rose (the other measures being difficult to quantify). It can be assumed that full effects of introducing a common currency will materialise after 30 years. It can then be shown that, taking into account the impact of exchange risk elimination, Poland's EMU accession should result in increasing dynamics of trade between Poland and the euro area by 4.3% a year.

There is no doubt that the above mentioned estimates should be treated very carefully. The conservatism follows from the characteristics of the country sample and time series used in the estimation. The Rose model was estimated for years in which EMU did not yet exist. As a result the group of countries with a common currency was dominated by pairs of countries showing considerable disproportions in terms of their geographical size and income. It will not be feasible to remove this obstacle in the coming years, because one has to reckon with a longer time-horizon required for the euro-driven growth of trade to materialise. Still, even if the impact of the common currency on the level of trade is considerably overestimated, Rose's studies show that the impact ought to be positive.

IV. SUMMARY

This study has presented theoretical and empirical aspects of the impact the exchange rate risk may exert on foreign trade. The results of empirical studies do not provide an unequivocal answer to the question about the direction and scale of this impact. However, the most recent studies (conducted with the use of the most advanced econometric techniques) point to a favourable impact of the creation of a common currency area on the volume of trade between the countries participating in a monetary union. It should thus be expected that Poland's EMU accession and attendant elimination of short- and long-term exchange rate risk will contribute to boosting trade between EMU countries and Poland with all the positive consequences it might entail for a long-term growth of Polish economy.

LITERATURE

1. Baldwin R. E. (1991), *On the microeconomics of the European monetary union.* In: *The Economics of EMU. Background Studies for European Economy No 44 "One market, one money".*

2. Bini-Smaghi L. (1990), *Exchange Rate Variability and Trade: Why Is It so Difficult to Find any Empirical Relationship?* Temi di discussione, Banca d'Italia, No. 145.

3. Borowski J., Brzoza-Brzezina M. (2002), *W zgodzie z naturą* [In Polish: In Harmony with Nature]. Gazeta Bankowa, no 6.

4. Brzoza-Brzezina M. (2002), *The Relationship Between Real Interest Rates and Inflation.* NBP Working Paper, no. 23.

5. The Calmfors Commission (1997), *EMU. A Swedish Perspective.* Kluwer Academic Publishers.

6. Calvo G. A., Reinhart C. M. (2000), *The Fear of Floating.* NBER Working Paper, No. 7993.

7. De Grauwe P. (1987), *International Trade and Economic Growth in the European Monetary System.* European Economic Review, No. 31

8. EC Commission (1990), *One Market, One Money. An Evaluation of the Potential Benefits and Costs of Forming an Economic and Monetary Union.* European Economy, No. 44.

9. European Central Bank (2002), *Economic Fundamentals and the Exchange Rate of the Euro.* ECB Monthly Bulletin, January 2002.

10. Feldstein M. (1991), *Does One Market Require One Money?* In: *Policy Implications of Trade and Currency Zones.* Federal Reserve Bank of Kansas City.

11. Frankel J. A., Romer D. (1999), *Does Trade Cause Growth?* American Economic Review, No. 19.

12. Frankel J. A., Rose A. K. (2000), *Estimating the Effect of Currency Unions on Trade and Output.* NBER Working Paper, No. 7857.

13. Hooper P., Kohlhagen S. W. (1978), *The Effect of Exchange Rate Uncertainty and the Prices and Volume of International Trade.* Journal of International Economics, no. 8.

14. International Monetary Fund (1984), *Exchange Rate Variability and World Trade.* Occasional Paper, No. 28.

15. Kenen P., Rodrik D. (1986), *Measuring and Analysing the Effects of Short-Term Volatility in Real Exchange Rates.* No. 58.

16. National Bank of Poland (2002), *Wstępna informacja o kondycji sektora przedsiębiorstw ze szczególnym uwzględnieniem stanu koniunktury w II kw. 2002 r.* [In Polish: Preliminary information on the condition of the enterprise sector with particular emphasis on the Q2 outlook].

17. Obstfeld M. (1997), *Europe's Gamble.* Brookings Papers on Economic Activity, 2:1997.

18. Perée E., Steinherr A. (1989), *Exchange Rate Uncertainty and Foreign Trade.* European Economic Review, No. 33.

19. Rose A. K. (2000), *One Money, One Market? The Effect of Common Currencies on International Trade.* Economic Policy, no. 30.

20. Rubaszek M. (2002), *Przewartościowanie złotego. Modelowanie kursu równowagi* [In Polish: Zloty overvalued. Modelling equilibrium rate] Mimeo

21. Solow R. M. (1956), *A Contribution to the Theory of Economic Growth.* Quarterly Journal of Economics, 70 (1).

22. Tymoczko D. (2001), *Renta mennicza po akcesji do Unii Gospodarczej i Walutowej – korzyści czy koszty?* [Seingniorage after EMU accession – benefits or costs?] NBP Conference „*Poland's Way to the Euro*", Falenty. www.nbp.pl

23. Ungerer H., Evans O., Mayer T., Young P. (1986), *The European Monetary System: Recent Developments.* IMF Occasional Paper.

24. Williamson (1985), *The Exchange Rate System.* 2nd edition. Institute for International Economics, Washington DC.

25. Wyplosz C. (1997), *EMU: Why and how It Might Happen.* Journal of Economic Perspectives 11(4).

ANNEX

Fig 1. 12-month moving standard deviation of 3-month (%) change in PLN/EUR[a][b] rate and zloty nominal effective exchange rate in 1995-2002
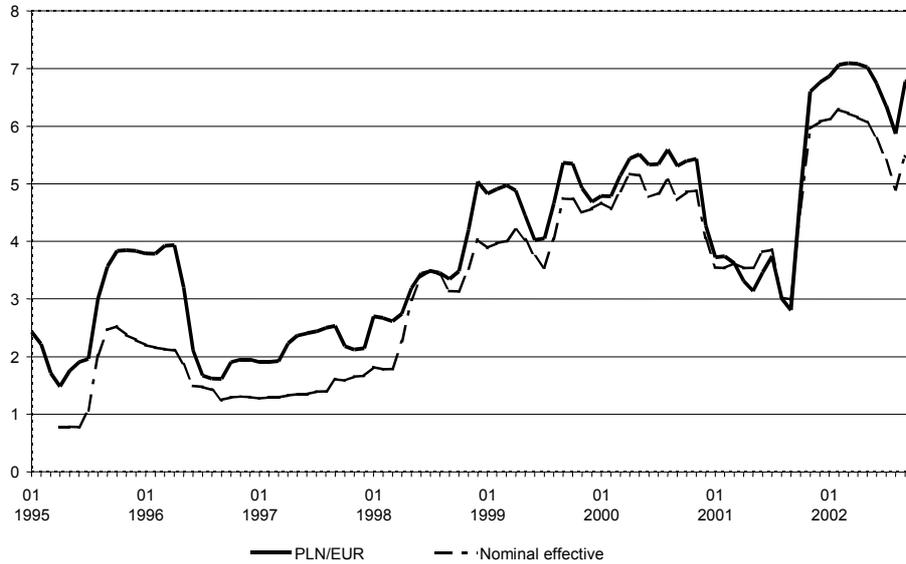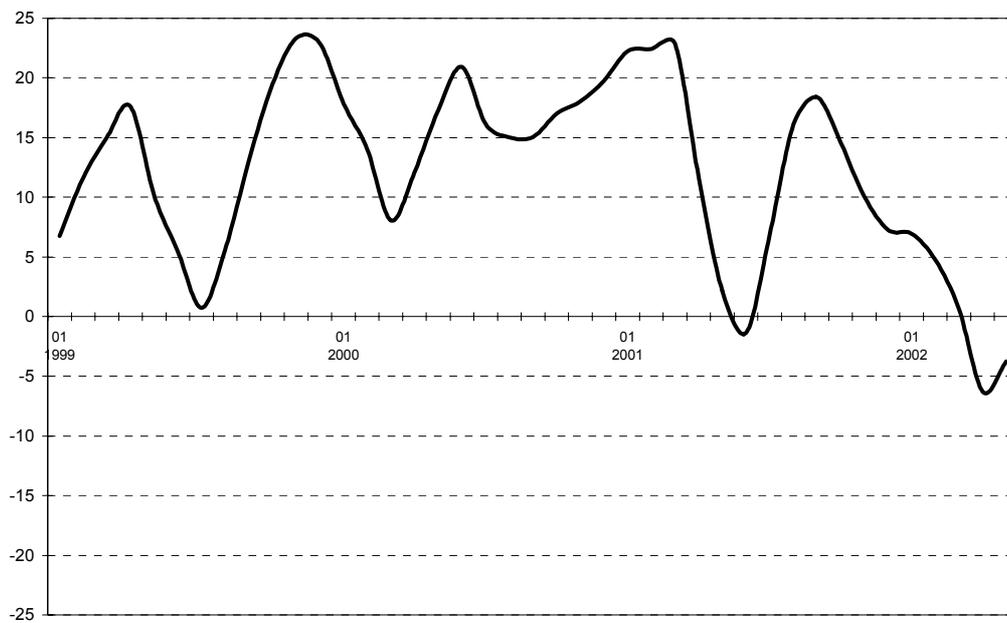

Source: Own calculations based on NBP data
[a] NBP fixing rate
[b] D-mark until the end of 1998

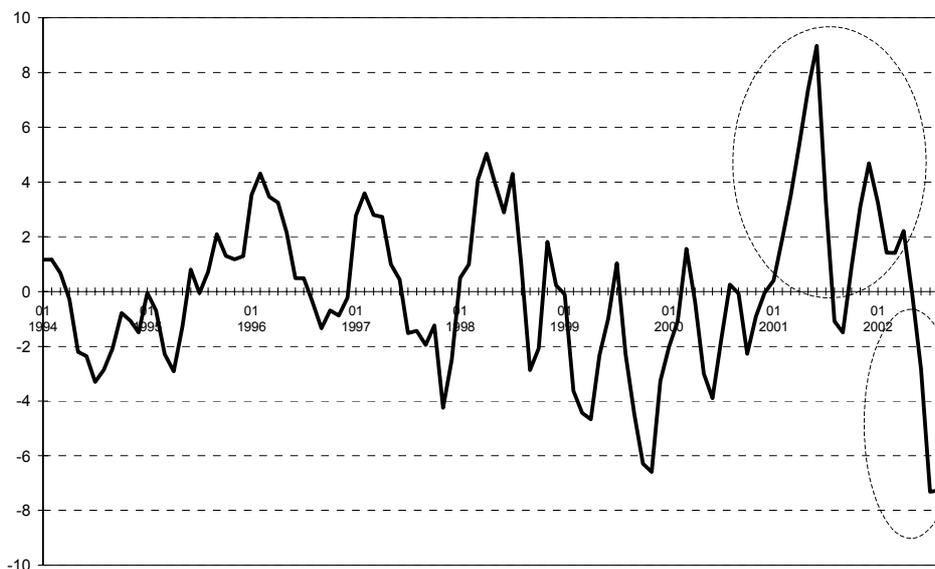**Fig. 2.** Deviation of forward[a] (+3M) PLN/EUR rate from spot rate[b] (%) in 1999-2002

Source: Own calculations based on Eurostat and NBP data
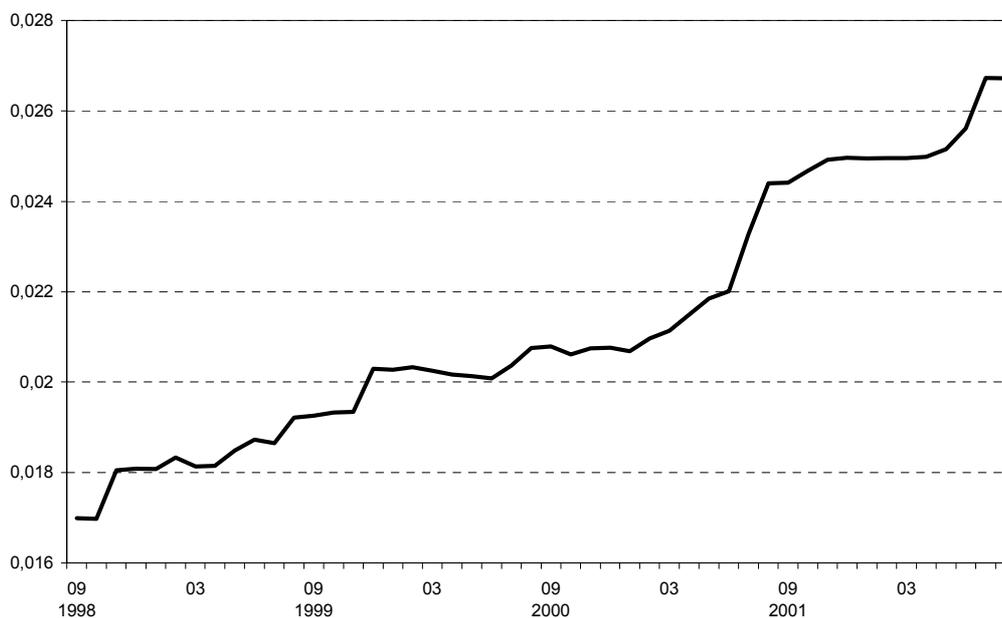[a] Forward rate derived from 3-month WIBOR and EURIBOR differential.
[b] NBP fixing rate.

Fig. 3. REER deviations from the HP trend (%) in 1994-2002 (12:1993=100; producer prices in the manufacturing sector as a deflator)

Source: Own calculations based on NBP data

Fig 4. 5-year moving standard deviation of monthly change in logarithm of PLN/EUR rate [a)b)]

Source: Own calculations based on NBP data, in accordance with formula proposed by Rose (2000)
[a)] NBP fixing rate
[b)] D-mark until the end of 1998