



The Impact of Exchange Rate on Poland's Trade Flows

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The aim of this paper is to investigate the effect of exchange rate on Poland's foreign trade, especially on bilateral trade flows between Poland and the Euro area, which is its major trading partner. The research verifies the theoretical concepts that explain how the exchange rate influences the trade turnover. The empirical analysis was preceded by a theoretical basis of the problem. Data used in this study covers the period from 2004 to 2013. The theoretical and empirical analysis confirm that the exchange rate is a substantial factor influencing bilateral trade turnover between Poland and its main trading partners. The Polish zloty depreciation is the cause for the Polish exports growth. In the case of imports, the depreciation of the Polish zloty causes a decrease of the value of the Polish imports. Moreover, the exchange rate is an important adjustment mechanism, thanks to which the Polish economy was able to avoid a large decline in exports and GDP during the recent financial and economic crisis.

Keywords: economy, international finance, exchange rate, foreign trade, trade competitiveness

Introduction

The collapse of the Bretton Woods system in the early 1970's and the adoption of a floating exchange rate regime posed a substantial question in the world economic research: the impact of exchange rate volatility on the international trade. Very recently, the global financial crisis, as the catalyst of the debt crises and central bank interventions in many countries especially in Europe and the United States, has increased exchange rate volatility again and brought the topic back to the discussion.

In light of these recent events, the question whether or not giving up a domestic currency and thereby eliminating exchange rate volatility with various other countries for boosting trade has become a very relevant question for many Central and Eastern European countries, including for Poland.

Furthermore, Poland represents an interesting objective of study because of its transition from a fixed exchange rate arrangement into a crawling peg and, more recently, to a free-float regime. After this, the accession to the European Union was achieved, which has also led to the plan of participating in the monetary integration. Above and beyond, the effect of exchange rate volatility on trade flows in the context of emerging market can

be seen in this example. In addition, international trade in Poland serves as a major channel of economic integration within the EU and the Euro area, because, generally, international trade tends to be a driver of the economy in countries adjacent to economies with open trade regimes, high presence of multinational companies and large volume of re-exports. The fact that this example fits to Poland can be illustrated by the increasing share of merchandise trade on Poland's GDP. The latest data of the UNCTAD shows 77,8% in 2013 as compared to 55,3% in 2003 (exports plus imports). The strong economic relations between Poland and European countries is confirmed by the fact that the EU's share in Polish exports is 74%, and in imports 57% (in 2013). The share of the Euro area countries is 51% in exports and 45% in imports. Moreover, the main trading partner in both exports and imports is still Germany. The euro is used for invoicing 63% of Poland's exports and 58% of imports.

Although the volume of Poland's international trade has been increasing since it joined the EU in 2004, it is constantly characterized by a long term negative trade balance. The reduction of Poland's negative trade balance has been largely affected by the foreign direct investment inflow, since the companies with foreign ownership account for a substantial share in Poland's exports. This situation makes Poland's economy more vulnerable to any adverse changes in other economies.

The exchange rate plays an important role in a country's export performance and currency volatility has an impact on international trade, the balance of payments and economic performance. However, views on the impact of exchange rate volatility on international trade flows are inconsistent, thus it is necessary to examine this matter further, and with knowledge of the application to small open economies.

The aim of this paper is to investigate the impact of exchange rate changes and volatility of the Polish zloty on Poland's foreign trade, especially on bilateral trade flows between Poland and the Euro area, which is its major trading partner. Data used in this study covers the period from 2004 to 2013. The empirical analysis was preceded by a theoretical basis of the problem. The paper is divided into two parts: theoretical and empirical. The theoretical part includes a description of theoretical concepts and literature review on the relationship between exchange rates and international trade, while the empirical part contains the statistical data analysis of the impact of the exchange rate level and volatility on trade in Poland.

Theoretical Concepts of the Relationship between Exchange Rates and International Trade

Following the end of the Bretton-Woods system of fixed but adjustable exchange rates four decades ago, the majority of economic literature on the

relationship between exchange rates and trade deals with the effect of increased variability (volatility) of exchange rates on trade. However, since the mid-2000s the focus of the academic research has also turned towards the relationship between the level (misalignment) of exchange rates and trade.

The Uncertainty Generated by Exchange Rate Risks

Generally, it is expected that higher exchange rate volatility leads to higher transaction costs for traders and is followed by a decrease of foreign trade. Theoretical analyses of this relationship have been conducted, among others, by Hooper and Kohlhagen (Hooper & Kohlhagen, 1978), who argue that, if changes in exchange rates are unpredictable, it increases uncertainty about companies' profits and reduces the benefits of foreign trade. Even if hedging in the forward markets were possible, there are limitations and costs which are especially considerable for small firms. Per contra, De Grauwe (1988) pointed out that the dominance of income effects over substitution effects on international trade can lead to a positive relationship between trade and nominal exchange rate volatility, because an increase in exchange rate volatility raises the expected marginal utility of export revenue and, therefore, can induce increasing of exports. According to the latest studies made by Taglioni (2002) and Ozturk (2006), it can be stated that the inverse effect of exchange rate volatility on trade flows, if it exists, is not large.

Theoretical studies have shown mixed effects. While most describe negative effects for an increase of exchange rate volatility on trade due to rising levels of uncertainty (Clark, 1973), some describe possible positive or ambiguous effects (Franke, 1991; Sercu & Vanhulle, 1992). The latter may depend on the aggregate exposure to risk (Viaene & de Vries, 1992) and on the type of shocks firms are exposed to (Barkoulas, Baum, & Caglayan, 2002).

To reduce the risk of exchange rate fluctuations, in theory, firms can hedge via forward markets. But those may be not sufficiently developed (Baron, 1976) or are costly and imperfect for small firms, as they are more likely to face liquidity constraints (Baldwin & Krugman, 1989). Thus, Wei (1999) found no empirical evidence for the hypothesis that the availability of hedging instruments reduces the impact of exchange rate volatility on trade.

An interesting research was presented by P. Bacchetta and E. Van Wincoop (Bacchetta & Van Wincoop 2000). They used a general equilibrium model, in which uncertainty arises from monetary and fiscal policy, to examine the impact of volatility on the levels of trade and welfare in a context of both fixed and flexible arrangements. One interesting outcome illustrating the complexity of the exchange rate-trade relationship is that monetary

stimulus in a country that leads to the depreciation of its exchange rate may not have much effect on trade, as the depreciation of the exchange rate, on the one hand, reduces imports but, on the other hand, the increase in domestic demand linked to the monetary stimulus may boost imports in an offsetting movement. Of course, the net effect will depend on a whole set of variables, from demand elasticity for imports to supply-side factors, such as the desire or ability of domestic producers to adjust prices to the depreciation of the currency.

Findings differ across the studies, as well, for an aggregation reason. In the IMF's study (2004) on exchange rate volatility and trade flows, it can be found that there is no obvious negative relationship between aggregate exchange rate volatility and aggregate trade. When the research is turned to bilateral trade, we do find evidence that exchange rate volatility seems to affect more bilateral trade than the aggregate one. Evidence on the analyzed relationship between exchange rate volatility and trade flows is characterized as heterogeneous as the results tend to be sensitive to the choices of sample period, model specification, proxies for exchange rate volatility and countries.

The Effect of Exchange Rate Misalignment

Since the mid-2000s, the policy and academic debate shifted away from the effects on trade of exchange volatility towards the effects of sustained exchange rate depreciation or perceived exchange rate misalignments (Auboin & Ruta, 2011). This meant emphasis fell less on the effects of variability and more on the real level of the exchange rate.

The literature on exchange rates and growth does not directly address the question of the trade effects of a currency undervaluation or overvaluation. Economic logic suggests that there are at least two opposite effects at work. An undervaluation of the currency has a direct negative effect on the exports of other economies that specialize in the production of goods that are relatively close substitutes and compete for market share in similar export markets (Rodrik, 2008). On the other hand, income growth of trading partners has an indirect positive effect on export performance.

On the issue of the level of exchange rates (misalignments), theoretical and empirical studies over the years show that the relationship between the level of a currency and trade is so multi-faceted and complex that it is hard to take a firm line in any particular direction. Economic theory suggests that, when markets are free of distortions, an exchange rate misalignment has no long-run effect on trade flows, as it does not change relative prices (Rodrik, 2008).

But long-run effects are predicted in models that assume market distortions, such as information problems or product market failures. In the short-

run, when some prices in the economy can be sticky, movements in nominal exchange rates can alter relative prices and affect international trade flows. These short-run trade effects, however, are not straightforward, as they are likely to depend on specific characteristics of the economy, including the currency in which domestic producers invoice their products and the structure of trade (for example, the prominence of global production networks). On the empirical side, the complexity of the relationship between exchange rate misalignments and trade yields mixed findings. For instance, a currency undervaluation is sometimes found to have a positive impact on exports, like a series of recent papers by Hausman, Pritchett, and Rodrik (2005), Eichengreen (2007), Rodrik (2008), and Korinek and Servén (2010), which show that a devaluation can play an important part in the growth process of developing countries. But the presence, size and persistence of these effects are not consistent across different studies.

The literature on exchange rate volatility and trade since the mid-2000s has continued to produce both theoretical and empirical papers, without changing the broad thrust of previous, relatively inconclusive analyses and evidence.

From a theoretical point of view, one of the main recent contributions comes from Broll, Wahl, and Wong (2006), who studied optimum production decisions by an international firm using portfolio theory. Their study showed that an increase in exchange rate risk (or expectation thereof) could have a negative, positive or neutral impact on trade. This impact depends upon the elasticity of risk aversion with respect to the standard deviation (or the mean) of the firm's random profit. These results tend to confirm those of Bacchetta and Van Wincoop (2000).

Literature Review on the Relationship between Exchange Rates and International Trade

On the question of the effects of exchange rate volatility on trade, the considerable array of theoretical and empirical literature remains somewhat ambiguous. As argued by Taglioni (2002, pp. 228), 'it is customarily presumed that the adverse effect of exchange rate volatility (on trade flows), if it exists, is certainly not large.' This conclusion is generally shared by Ozturk (2006), which reveals a rather wide range of empirical evidence, some in favor and some against the hypothesis of a negative relationship between exchange rate volatility and trade. Coric and Pugh (2010) accurately summarized this situation arguing that: 'on average, exchange rate variability exerts a negative effect on international trade. Yet, [...] this result is highly conditional.'

A detailed literature survey on the effects of exchange rate volatility on trade is presented in Table 1.

Table 1 Survey of Empirical Work on the Relationship between Exchange Rates and Trade

Study	(1)	(2)	(3)
<i>Positive Effect</i>			
Brada and Mendez (1988)	1973–1977 A	Real	Positive effect
De Grauwe and Verfaillie (1988)	1975–1985 A	Real	Level of trade significantly stronger within EMS than outside the EMS
Mann (1989)	1977–1987 Q	Real	Few significant results
Medhora (1990)	1976–1982 A	Nominal	Not significant and positive effect
Asseery and Peel (1991)	1972–1987 Q	Real	Significant and positive except for UK
McKenzie and Brooks (1997)	1973–1992 M	Nominal	Positive effect
McKenzie (1998)	1969–1995 Q	–	Generally positive effect
Kasman and Kasman (2005)	1982–2001 Q	Real	Significant positive effect on export
<i>Negative Effect</i>			
Akhtar and Hilton (1984)	1974–1981 Q	Nominal	Negative effect
Belenger (1988)	1976–1987 Q	–	Significant and negative in 2 sectors
Koray and Lastpares (1989)	1961–1985 M	Real	Weak negative relationship
Peree and Steinherr (1989)	1960–1985 A	Nominal	Negative effect
Caballero and Corbo (1989)	–	Real	Significant and negative effect
Bini-Smaghi (1991)	1976–1984 Q	Nominal	Significant and negative effect
Feenstra and Kendall (1991)	1975–1988 Q	–	Negative effect
Kumar and Dhawan (1991)	1974–1985 Q	Nominal and real	Not significant and negative effect
Belenger (1992)	1975–1987 Q	Nominal	Significant and negative effect
Savides (1992)	1973–1986 A	Real	Negative effect
Chowdhury (1993)	1973–1990 Q	Real	Significant and negative effect
Caporale and Dorodian (1994)	1974–1992 M	Real	Significant and negative effect
Hook and Boon (2000)	1985–1997 Q	Nominal and real	Negative effect on export
Doganlar (2002)	1980–1996 Q	Real	Negative effect on export
Vergil (2002)	1990–2000 Q	Real	Negative effect on export
Das (2003)	1980–2001 Q	Nominal and real	Significant negative effect on export
Baak (2004)	1980–2002 A	Real	Significant negative effect on export
Clark, Tamirisa and Wei (2004)	1975–2000 A	Nominal and real	Negative and significant effect
Arize (2005)	1973–2004 Q	Real	Significant negative impact
Lee and Saucier (2005)	1986–2003 Q	Nominal	Negative effect on export

Continued on the next page

Table 1 Continued from the previous page

Study	(1)	(2)	(3)
<i>Mixed Results Or No Effect</i>			
Gotur (1985)	1974–1982 Q	Nominal	Little to no effect
Bailey, Tavlas and Ulan (1986)	1973–1984 Q	Nominal	Not significant, mixed effects
Bailey, Tavlas and Ulan (1987)	1962–1985 Q	Nominal and real	Little to no effect
Bailey and Tavlas (1988)	1975–1986 Q	Nominal	Not significant
Lastrapes and Koray (1990)	1975–1987 Q	Real	Weak relationship
Akhtar and Hilton (1991)	1974–1981 Q	Nominal	Not significant, mixed effect
Kumar (1992)	1962–1987 A	Real	Mixed results
Gagnon (1993)	Q	Real	Not significant
Frankel and Wei (1993)	1980–1990 A	Nominal and real	Small and negative in 1980, positive in 1990
Kroner and Lastpares (1993)	1973–1990 M	Nominal	Significant, varied signs and magnitudes
Daly (1998)	1978–1992 Q	Real	Mixed results
Aristotelous (2001)	1989–1999 A	Real	No effect on export
Tenreyro (2004)	1970–1997 A	Nominal	Insignificant and no effect on trade
Hwang and Lee (2005)	1990–2000 M	Real	Positive effect on import and insignificant effect on export

Notes Column headings are as follows: (1) sample period (A – annual, Q – quarterly, M – monthly), (2) nominal or real exchange rate used, (3) main result. Adapted from Ozturk (2006, pp. 88-92).

Empirical Analysis

Methodology Description

To estimate the impact of exchange rate level and volatility on foreign trade, a statistical data analysis of the impact of exchange rate level and volatility on trade in Poland is used. The sample consists of Poland, the Euro area, the European Union, Hungary, Czech Republic and Poland's main trading partners. The data sources are UNCTAD, the European Central Bank and the Eurostat statistical databases. The analysis period starts in 2004 and ends in 2013.

Exchange Rate Level and Trade in Poland

The exchange rate system in Poland was transformed from a fixed exchange rate arrangement into a crawling peg and, more recently, to a floating regime (from 2000). The ongoing process of integration, crowned by the accession of Poland to the European Union in May 2004, has increased significantly the importance of the external environment and the exchange rate for the Polish economy. Polish accession to the European Union had a significant

impact on all the variables that determine the balance of payments, including the determinants of the balance on current account (Bańbuła, Kozieński, & Rubaszek, 2011). A noticeable trend was the increasing deficit on current account, which steadily declined in previous years (Table 2).

In the period 2003–2013, the value of exports of goods rose steadily from 24.3% to 38.7% of GDP, whereas the relevant import share rose from 31.0% to 39.1% (Table 2). At the same time, the geographical structure of Polish trade gradually shifted from the post-communist countries towards the EU countries. In 2013, about 51% of Polish exports were sold to the Euro area and almost 75% on EU markets (Table 3 and Table 4). As a result, the external competitiveness of Polish products is currently determined mostly by the zloty rate against the euro (Table 5).

With the increasing trade openness of the Polish economy, the use of the euro in trade settlements and invoicing also rise, and, therefore, the impact of the exchange rate on trade and on the economy are becoming more important. The use of the euro for trade invoicing is shown in Table 5, along with US dollar invoicing. For European countries (except Ukraine), EU members or not, the euro plays a significant role.

The trade channel has been important in explaining the impact of the crisis on growth. While all Central and Eastern European countries (CEE) recorded a sharp decline in exports between the third quarter of 2008 and the third quarter of 2009, the magnitude of the decline exhibited notable cross-country differences and varied between more than 16% in Lithuania, 9% in Poland and less than 4% in Romania. The reason for the decline in exports was first of all a reduction in the global economic activity, as a result of the crisis, among major Polish trade partners – especially in the first half of 2009. It should be mentioned that the primary buyer of Polish goods are the developed countries and, within this group, the EU countries (79,9% in 2009, see Table 3). A strong decline of import demand in Poland, mainly due to the significant increase in import prices expressed in the national currency, could be explained, among others, by the strong depreciation of the Polish zloty.

The impact of changes in the exchange rate of domestic currency for foreign trade was asymmetrical, since its effect was weaker on exports than on imports. This can be explained by the fact that exchange rate changes have a greater impact on the domestic entities than on foreign companies, which dominated in the export. It should be mentioned here that of all the entities participating in Poland's commodities exports, around 60% were companies with foreign capital (Mroczek, 2010). However the depreciation of the Polish zloty increased the profitability of exporters, allowing them to maintain sufficient liquidity with decreasing sales. The research of the Instytut Badań Rynku, Konsumpcji i Koniunktur shows that, without the de-

Table 2 Poland's Exports, Imports and Merchandise Trade Balance During the Years 2003–2013 (% of GDP)

Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total exports	24.3	29.2	29.4	32.1	32.6	32.5	31.7	33.4	36.5	36.7	38.7
Total imports	31.0	34.9	33.4	36.8	38.6	39.8	34.7	37.1	40.6	39.1	39.1
Trade balance with all countries of the world	-6.6	-5.7	-4.0	-4.7	-6.0	-7.3	-3.0	-3.6	-4.1	-2.4	-0.4
Trade balance with euro area	-2.4	-1.7	-0.7	-0.5	-1.4	-1.8	1.2	1.7	1.1	1.8	2.3

Table 3 Share of EU and Euro Area in Poland's Exports and Imports During the Years 2003–2013 (in %)

Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
EU share in exports	82.6	80.7	79.0	79.2	79.1	78.2	79.9	79.2	78.0	75.5	74.3
EU share in imports	69.8	68.9	66.3	63.9	64.2	62.1	61.9	59.0	59.4	56.4	57.4
Euro area share in exports	61.3	59.4	57.7	56.4	55.7	54.9	57.2	56.2	54.6	52.2	51.2
Euro area share in imports	55.9	54.6	52.9	50.5	50.7	49.3	48.9	46.2	46.4	44.3	44.9

Table 4 Share of Poland's Major Trading Partners

Year	First partner			First partner			First partner		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Export	2004	Germany	22 132.309	30.0	Italy	4 507.834	6.1	France	4 454.315
	2007	Germany	35 901.248	25.9	Italy	9 151.637	6.6	France	8 443.139
	2010	Germany	40 890.945	26.0	France	10 730.658	6.8	United Kingdom	9 956.000
	2013	Germany	49 588.250	24.8	United Kingdom	13 001.851	6.5	Czech Republic	12 208.249
Import	2004	Germany	21 479.241	24.4	Italy	6 934.260	7.9	Russian Fed.	6 390.629
	2007	Germany	39 434.621	24.0	Russian Fed.	14 352.843	8.7	China	11 753.417
	2010	Germany	37 784.400	21.7	Russian Fed.	18 200.713	10.5	China	16 514.374
	2013	Germany	42 994.484	21.3	Russian Fed.	25 267.712	12.5	China	19 127.398

Notes Column headings are as follows: (1) country, (2) million USD, (3) percentage. Based on data from UNCTAD (<http://unctadstat.unctad.org>).

Table 5 Use of the Euro and the US Dollar for Invoicing in Exports and Imports (Average for 1999–2010)

Country	Export		Import	
	Euro share (%)	USD share (%)	Euro share (%)	USD share (%)
Poland	62.94	31.83	58.25	30.57
Hungary	78.64	16.40	69.86	21.34
Czech Republic	71.64	13.63	68.21	19.22

Notes Adapted from Lai and Yu (2014, p. 21).

Table 6 Change in Total Exports and the Nominal and Real Effective Exchange Rate (Percentage Changes between Q3 2008 and Q3 2009)

Country	Total exports	NEER	REER-CPI
Bulgaria	-6.7	1.0	1.8
Estonia	-9.6	1.8	0.6
Latvia	-14.7	2.9	3.8
Lithuania	-16.5	2.9	5.1
Czech Republic	-7.7	-4.7	-4.8
Hungary	-6.9	-12.2	-8.0
Poland	-9.0	-20.5	-17.0
Romania	-3.7	-14.4	-10.1

Notes Total exports comprise goods and services, and are expressed in constant prices. NEER is the nominal effective exchange rate, REER-CPI is the CPI-deflated real effective exchange rate. A positive (negative) NEER or REER value implies an appreciation (depreciation) over the time period. The first four countries have fixed exchange rate regimes or currency board arrangements, while the last four countries have more flexible regimes with the central banks pursuing inflation targeting strategies. Adapted from European Central Bank (2010b, p. 90).

preciation of the zloty, the volume of exports would have fallen by about 2,5 percentage points more, and the volume of imports by about 2,5 percentage points less. The result led to the growth of revenues of Polish exporters of about 11,7 billion zlotys compared to 2008, while expenditures on imports decreased 42,3 billion zlotys, allowing to maintain profitability at a level only slightly lower than in 2008 (Przystupa, 2010).

A floating exchange rate regime and the depreciation of the zloty largely contributed to an improvement in trade competitiveness. The depreciation of the Polish zloty against the euro was of 41% in the period from August 2008 to February 2009. It had a positive impact on exports, but also led to decline in imports and to satisfy domestic needs by domestic producers (Mucha-Leszko & Kąkol, 2011, pp. 171–172). Table 6 and Figure 1 show the total exports decline rates and changes in nominal and real effective exchange rate.

The strong depreciation of the Polish zloty was intensified by a speculative attack on the domestic currency. When the zloty started to weaken

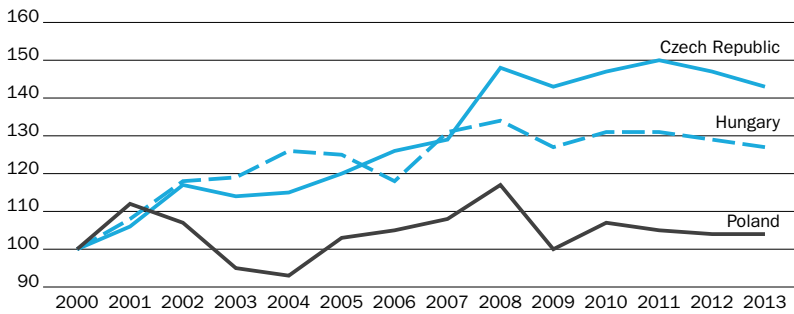


Figure 1 Real Effective Exchange Rate (REER, CPI Based) During the Years 2000–2013 (2000 = 100; a decreasing REER value implies a depreciation over the time period; based on data from UNCTAD (<http://unctadstat.unctad.org>))

sharply, many Polish companies began reporting large losses on currency options contracts. The strong appreciation of the Polish zloty from May 2004 until July 2008 inclined domestic exporters to use currency options in management of exchange rate risk. But these strategies, advised by financial institutions, were rather speculative ones. Several exporters went bankrupt, financial situation fully deteriorated and the Polish government had to take immediate action to solve the problem of toxic options (Mitreġa-Niestrój, 2011).

The relationship between the zloty exchange rate and trade flows is presented in Figures 2 and 3. It can be concluded that the depreciation of the zloty was followed by an improvement in the trade balance. This applies both to trade between Poland and the Euro area countries, as well as between Poland and all the countries of the world.

The International Monetary Fund pointed out that the floating exchange rate system in Poland and the ability to adjust the interest rate to the current economic conditions and changing situation during the crisis provided better economic performance, and recommended to postpone joining the monetary union (Mucha-Leszko & Kąkol, 2011, pp. 171–172).

Exchange Rate Volatility and Trade

The Polish zloty is traded under a flexible exchange rate regime. With inflation targeting and freely floating, Polish exporters have faced during the past years rather volatile exchange rates. The exchange rate of the Polish zloty against the euro showed a relatively high degree of volatility (Table 7, Table 8 and Figure 4).

Over the last ten years the Polish economy has been characterized by a high variability of foreign exchange rate, current account balance and a high level of inflation variability, especially in times of economic crisis. The

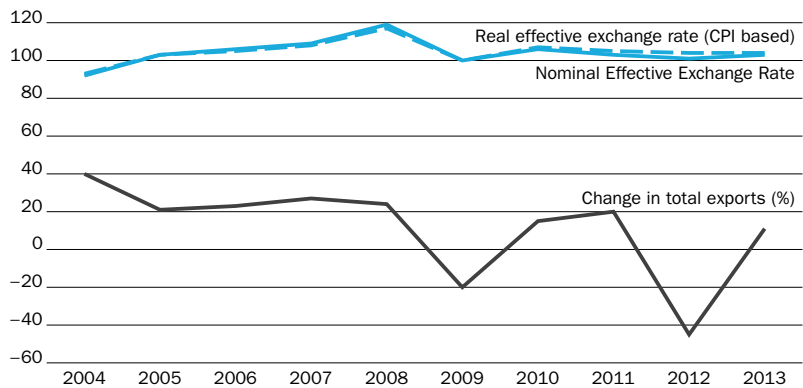


Figure 2 Changes in Total Exports (%), NEER and REER (2000 = 100) in Poland During the Years 2004–2013 (based on data from UNCTAD (<http://unctadstat.unctad.org>))

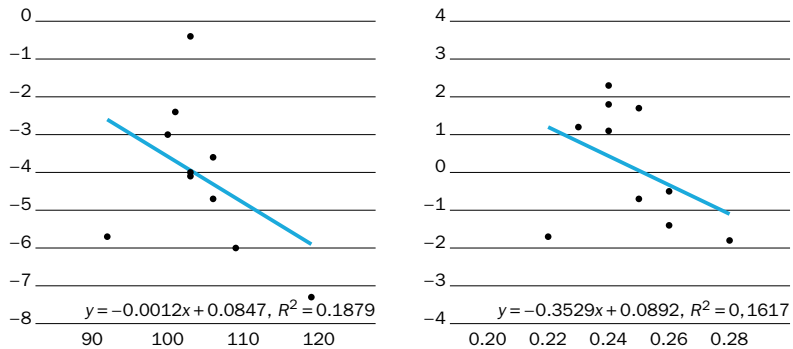


Figure 3 Trade Balance between Poland and All the Countries of the World (left-hand panel) and between Poland and the Euro Area (Right-Hand Panel) and the Polish Zloty Exchange Rate (Nominal Effective Exchange Rate 2000 = 100 and PLN/EUR) in the Period of 2004-2013 (based on data from UNCTAD (<http://unctadstat.unctad.org>))

Table 7 Exchange Rate Vis-à-Vis Euro* (Average Annual Percentage Change) During the Years 2006–2013

Country	2006	2007	2008	2009	2010	2011	2012	2013	2014**
Poland	3.2	2.9	7.2	-23.2	7.7	-3.2	-1.6	-0.3	0.3
Hungary	-6.5	4.9	-0.1	-11.5	1.7	-1.4	-3.5	-2.6	-3.6
Czech Rep.	4.8	2.8	10.2	-6	4.4	2.7	-2.3	-3.3	-5.6

Notes * A positive number denotes an appreciation vis-à-vis the euro and a negative number a depreciation. ** Data for 2014 are calculated as a percentage change of the average over the period 1 January 2014–15 May 2014 compared with the average of 2013. Based on data from the European Central Bank (2008, p. 30; 2010a, p. 33; 2012, p. 37; 2014, p. 40).

Table 8 Maximum Percentage Deviations of the Bilateral Exchange Rate against the euro from Its Average Level in Reference Date

Period	Poland		Hungary		Czech Republic	
	(1)	(2)	(1)	(2)	(1)	(2)
1.11.2004–31.10.2006	11.2	–0.6	1.4	–14.6	10.2	–0.5
19.4.2006–18.4.2008	13.0	–4.8	7.7	–6.6	13.0	0.9
24.4.2008–23.4.2010	6.9	–41.8	10.1	–24.7	8.4	–17.7
3.5.2010–30.4.2012	5.3	–12.4	5.0	15.9	6.4	–1.5
16.5.2012–15.5.2014	6.0	–2.8	6.3	–7.1	3.5	9.6

Notes Based on data from the European Central Bank (2006, pp. 68, 130, 162; 2008, pp. 84, 148, 164; 2010a, pp. 86, 164, 182; 2012, pp. 98, 156, 174; 2014, pp. 100, 158, 176).

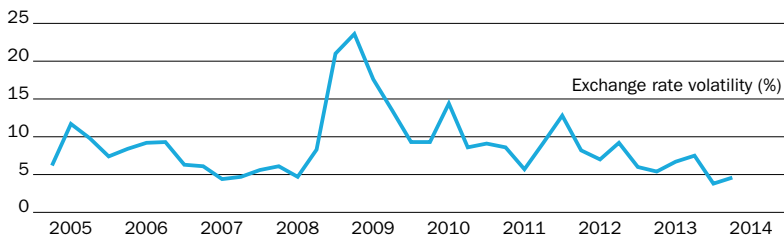


Figure 4 Exchange Rate Volatility (Average of Three-Month Period Ending in Specified Month). Annualised Monthly Standard Deviation (As a Percentage) of Daily Percentage Changes of the Exchange Rate against the Euro. Based on European Central Bank (2006, p. 162, 2008, p. 164, 2010a, p. 182, 2012, p. 174, 2014, p. 176)

analyses presented by J. Bilski indicate that the exchange rate and prices in Poland's economy played a crucial role in its adjustment processes (Bilski, 2010).

It is generally expected that higher exchange rate volatility leads to higher transaction costs for traders and it is followed by a decrease of foreign trade. Foreign trade of small economies is affected relatively more by exchange rate volatility than trade flows of large economies, and are more dependent on their sector and business partners (Hutchet-Bourdon & Korinek, 2011). Both theoretical and empirical analyses confirm this relationship.

The results of research conducted by Šimáková (2013) suggest that the nominal exchange rate volatility of Polish zloty has a significant negative effect on bilateral trade between Poland and its major trading partners. The data in Table 9 and in Figure 4 also confirm this thesis.

Exchange rate volatility is also becoming important in the context of integration into the Euro area. High variability in relation to the euro precludes Poland from joining the Euro area for many years (Bilski & Janicka, 2011,

Table 9 Changes in Polish Export to All Countries of the World and to Euro Area Countries (Annual Percentage Change) During the Years 2004–2013

Region	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
World	39.9	21.1	22.6	26.6	23.8	–20.5	14.9	19.8	–4.5	11.2
Euro area	35.6	17.6	19.9	25.1	22.0	–17.2	13.1	16.3	–8.7	9.1

Notes Based on data from UNCTAD (<http://unctadstat.unctad.org>).

pp. 178–180). From this point of view, before the inclusion of the Polish zloty to ERM II, some changes in the exchange rate mechanism should be introduced, in order to ensure a stability increase of the Polish currency.

Conclusions

This analysis shows that the situation in Poland's foreign trade during the global financial crisis (2008–2009) was, *inter alia*, influenced by: a strong depreciation of the domestic currency, an export diversification and a stronger decline in imports than in exports.

Poland was the only country in the European Union that recorded a small but positive rate of economic growth in 2009. Particularly important for such a situation were Poland's foreign trade and its domestic household spending. As numerous studies have shown, Polish exports had not dipped as strongly as in other countries, mainly due to the depreciation of the zloty and by improving price competitiveness of exported goods.

During the period 2004–2013, the Polish zloty showed an unusually high variability in relation to the euro. These strong fluctuations in the Polish currency exchange rate had a negative impact on trade flows and moved away for many years the possibility of the accession of Poland to Economic and Monetary Union. On the other hand, and in the particular case of Poland, the exchange rate is an important tool for dealing with exogenous shocks. Moreover, the exchange rate is an important adjustment mechanism, thanks to which the Polish economy was able to avoid a large decline in exports and GDP during the recent financial and economic crisis. For Poland, the exchange rate is, thus, a tool for dealing with exogenous shocks. A fast adoption of the euro in Poland is, therefore, not necessary.

Nevertheless, further research would be required using econometric methods (e.g. GARCH, TARCH, gravity models), since the relationship between exchange rate volatility and exports is not solved as shown in previous researches.

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