THE OVERSHOOTING RESULTS IN POLAND IN 1999-2000

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This paper attempts at expanding the famous overshooting result derived by Dornbusch\(^1\) upon analogous results which can occur on the appreciation side of exchange rate, called overshooting—a result. The overshooting—a result is subject to empirical verification following the example of the fluctuations in exchange rates of the Polish zloty (PLN) in 1999-2000.

For analysis it seems reasonable to assume that the pattern of the effect of economic processes upon currency rate is broadly symmetrical, which means that changes in economic volume affecting exchange rate depreciation, if made in the opposite direction would produce currency appreciation.

1. The place of the overshooting model in the theories of exchange rate determination

We will begin our analysis by placing the broad concept of overshooting against the background of traditional models and strategies for exchange rate forecasting. In the last few decades the most popular classification has been that presented by Jeffrey A. Frankel\(^2\), who distinguishes two sets of theories of exchange rate expectations: one comprising fundamental concepts which take account of the effects of basic economic quantities upon exchange rate levels; the other set encompasses non-fundamental models which utilize extra-economic factors to account for currency movements, such as the behavior of market players and speculators, the market reaction, political events, and others.

Frankel classifies the exchange rate models under:

Figure 1:
Classification of exchange rate models

Sources: J.A. Frankel, op. cit. p. 84

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J.A. Frankel divides fundamental theories into two groups: flow models and asset models.

Flow models form the theories of purchasing power parity and interest rate parity, and are characterized by the following features:

1. The subject of their analysis is flows of commodities and money between domestic and foreign entities.
2. They examine phenomena within the space of time, selected and determined by the researcher.
3. They allow to investigate the phenomena which are characterized by highly dynamic processes, for example, international capital flows.
4. The models apply to the medium and long-term investigations.

The asset concepts for exchange rate were formed in the late 1970s, when after introduction of floating exchange rates of main currencies, it turned out that the classical models of determining exchange rates had failed to explain volatility in the foreign exchange market. Defying logic, the countries which showed balance of payments surplus had depreciating currencies, while the trade deficit countries appreciating currencies.

As M. Melvin said: The world of international finance turns out to be more complicated than some basic exchange rate models have assumed. Scientists are still searching for new determinants of exchange rate distortions. Attempts are made to assess the impact of changes in asset status on exchange rate determination. The introduction and development of the international capital assets models has it place in the post-war history of international finances. The liberalization of capital flows in the mid-1980s made it possible to accomplish the fundamental assumption of the asset model — freer capital movements.

In accordance with the asset theory, the exchange rate between two currencies is calculated by comparing foreign assets price to domestic assets price. The said assets are generally bonds, shares, and other securities. The asset models are characterized by the following features:

1. The subject of their study is changes in the level of assets as well as in their structure.
2. These are the short-term models.
3. The speed or velocity of price changes on the financial markets exceeds the changes in the prices of goods and services, the so-called sticky-prices.
4. The methods adopted in the asset models can be applied only on the advanced foreign exchange currency markets.

In the above classification of exchange rate models, Dornbusch's overshooting result was included by J.A Frankel in the category of asset models. Presumably, as a result of the acceptance of the sticky-price model. A determent of changes in commodity prices in relation to the price changes of assets does not deny the fact that Dornbusch's model has been founded on the purchasing power parity. More precisely, it analyses the causes of foreign exchange rate oversensitivity, as well as their deviation from the PPP.

The overshooting result, like the B-S (Balassa-Samuelson) effect contains adjustment mechanisms (commodities interest arbitration), which places them among the flow models. The asset models do not assume the operation of the adjustment processes to achieve external equilibrium. Functioning mechanisms in these models produce changes in profitability of investments in domestic and foreign securities, which has an accurate reflection of fluctuating exchange rate volatility.

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3 The analyses show that in small open economies the adjustment mechanism (interest arbitrage and commodities arbitrage) of the flow models can also be applied to the short-term.

2. The Overshooting Model

The core of the overshooting model is the assumption that commodity prices tend to react more slowly to impulses behind monetary policies than do the prices of financial instruments. In consequence, thus induced processes are absorbed by the exchange rate which functions as a shock absorber. The resultant overreaction of the exchange rate was termed by Dornbusch “overshooting”. The term is open to interpretation. In the literature on exchange rates it is generally defined as:

- the difference between the current rate and the rate arising from purchasing power parity;
- the differences between the short-term and long-term equilibrium exchange rates;
- the difference between the equilibrium exchange rate of the real market and the hypothetical exchange rate of the perfect market, i.e., the market in which buyers and sellers have complete information about the substantial changes in the market; such interpretation presupposes that the parties involved in a particular market do not possess full details of the nature of market disturbances.

For the basic prepositions of the model that have been presented here, one of the three, or all of the three interpretations of the overshooting concept can be accepted.

The underlying principles of the model: (1) There is a short-term price elasticity. (2) A nominal growth in the money supply in the short term is equal to a real growth; since the prices are fixed, an increase of money supply to a decrease in the domestic interest rate. (3) A reduction in interest rates encourages the investors to invest their assets abroad. (4) A drop in demand for the domestic assets leads to the lowering of the domestic currency — a currency depreciation.

The conclusion to be drawn from the presented prepositions of the model can be formulated as follows:

In the long run, foreign exchange rate is proportional to the growth of money supply and price rise, whereas in the short run the exchange rate increases more than proportionally.

Dornbusch’s model can be presented on the chart:

![Figure 2: The Overshooting model of the exchange rate](chart)

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5. E. Chrabonszczewska, K. Kalicki: op.cit., p. 54
As a starting point for our discussion, we will take a situation in an economy where the money supply at 0-A level, with prices at P, and exchange rate at K, sets the equilibrium A. A growth of the money supply to level A' in the medium term and long term should move the prices to level P' and the exchange rate to level K' so that the growth of the money supply and a currency depreciation would be proportional to the growth of the money supply. However, this is not so. The short-term price rigidity leads to the initiation of a relationship between cause and effect, which results in a reduction in interest rates, capital outflow and depreciation of change rate to the point K". B is a new point of the short-term equilibrium. The overshooting is a differential between K' and K". A currency depreciation by a greater degree than proportional increases competitiveness and gives a boost to exports. The demand for goods increases, a prolonged business activity leads to a price rise. This leads to a decrease in the supply of real money, followed by the initiation of appreciation tendencies, exchange rate returns to the level K', and an economy to a long-term equilibrium A'.

Dornbusch’s theory met with harsh criticism from colleagues for two reasons. Firstly, many critics\(^7\) say that the overshooting result is just a special case of the reaction of exchange rate to the changes in money supply. Dornbusch offered little evidence to substantiate his theory, narrowing down an area of his research to the above relationship: money supply — exchange rate, with the omission of a variety of effects on basic economic quantities. Another problem is empirical verification of the principles of the model. According to K.S. Rogoff\(^8\) the examination of the exchange rate of some main currencies does not confirm the truth of Dornbusch’s theory in practice. It appears that both Dornbusch’s result and other models for determining short-term exchange rate volatility cannot be subject to statistical verification. Short-term volatility in the foreign exchange market is influenced by so many factors that identification of the overshooting result is almost impossible.

3 The Overshooting-a Model

In the introduction, we assumed that monetary policy and the price exchange rate adjustment mechanisms operate symmetrically on the appreciation and depreciation side of the official exchange rate. Thus, the concept of undershooting is the reverse of that of overshooting, and to describe its functioning you repeat the same sequence of events as described by Dornbusch, but in reverse order, as illustrated in Figure 3.

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7 A. Koronowski: Zmienność kursu walutowego pod wpływem polityki pieniężnej, Bank i Kredyt, 2000, No 11, p. 11
8 K.S. Rogoff: Why are G-3 Exchange Rate so Fickle, Finance and Development, June 2002, No 2
A starting point for our discussion is the restricting money supply, which initiates the following mechanisms:

1. The delayed response of commodity prices to monetary policy impulses causes that the nominal restriction of the size of the money supply equals the real one.

2. The result of item 1 is the rise in domestic interest rates, and the consequential increased demand for financial assets by foreign investors.

3. An inflow of foreign capital induces a rise in the domestic currency rate to level $K''$.

4. Domestic currency appreciation restricts the size of exports and stimulates additional imports, which in consequence, leads to decreases in demand for domestic goods, and causes that the economy is heading into a recession.

5. The decrease in economic activity accelerates deflationary processes (in practice it can mean restricting the CPI (Consumer Price Index) growth to the level of 0-1%), and leads to a steady growth of real money supply.

6. A decrease in interest rates follows as well as in rates of return from domestic financial assets.

7. The foreign exchange rate depreciates from $K''$ to $K'$.

8. The operation of the adjustment mechanism prices — exchange rates make it possible for the economy to achieve the balance with the money supply $A'$, the exchange rate $K'$ and prices $P$.

4. The overshooting—a result in Poland in 1999-2000

Advancements in Poland’s transformation to a market economy in the mid 1990s created appropriate conditions for bringing the overshooting into operation.

Those were as follows:

1. the introduction of fluctuating exchange rate — the level of which is determined by the situation in the foreign exchange market;

2. the deregulated financial markets;

3. the liberalization of capital flow;

4. the higher level of involvement of financial sector in the foreign exchange market.

In April 2000 the new exchange rate mechanism was introduced. Floating exchange rate replaced the existing system of the “crawling pegs within bands”.

By 1999 the Polish central bank decided to give up directly controlling the foreign exchange market. The central rate of polish zloty was abandoned, and ever since no official denominator has been used to set exchange rates.

A transformation that occurred at the end of 1990s, the beginning of the 2000s led to the implementation of a more liberal exchange rate policy, or more precisely, the central bank gave up the practice of determining currency rates as a form of monetary policy instrument.

The late 1990s witnessed an increase in deregulation9 of the markets in Poland. Without going into detail about the process, suffice it to say that in the year 2000 the amount of foreign investment in the privatization

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of Poland's banking sector reached a record level of 80% — one of the highest indices in the world.

The liberalization of capital flow has been progressing quite rapidly since the early 1990s. In 1995 a step was made towards currency convertibility in accordance with the Article 8 of the IMF, which allowed for capital transfers to grow sharply.

We may assume that the rate of liberalization in the year 2000 approximated to that in Greece in the early 1990s, which is reflected in the scale of capital turnover between Poland and other countries.

<table>
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Table 1: Foreign currency flow between Poland and foreign countries in 1998-2002 in billions of USD
Sources: National Bank of Poland

The following data indicates the ever-increasing influence of financial sector on the domestic currency rate determination. The above processes in Poland's economy coincided with some momentous events on the foreign exchange markets, which cannot be accounted for by the existing theoretical models. Strange as it may seem, within the space of eight months (October 1999 - May 2000) the Polish zloty rose by 22 per cent against the euro, as the graph illustrates.

Graph 1: The zloty-euro monthly exchange rate
Sources: National Bank of Poland
Without a shadow of doubt, such a sharp appreciation of the zloty against euro was not justified economically. It should be remembered that Poland’s inflation rate was about 7.3 per cent in 1999 and rose to 10.1 percent in 2000, whereas the EU had average annual inflation of about 2 per cent.

Poland’s current account deficit relating to the Polish GNP was 5.5 per cent in 1999, and 6.3 per cent in 2000.

Many authors of scientific publications try to justify such a sharp appreciation in the Polish currency on the grounds of the B-S effect. However, the fact of the 20 per cent increase in exchange rate of the zloty casts doubt on the output hypothesis. While accepting the occurrence of the result, we judge that it could have contributed to the growth of exchange rate in the range of 2 to 3 per cent. There still remain 20 per cent to be accounted for.

Obviously, that cannot have been due to the non-fundamental factors, such as a speculative bubble. Such a high rise must have been supported by some economic factors. There remains the overshooting-a result.

The central premise is that in 1999-2000 the measure of money supply M-2 fell drastically to 19.3 % in 1999, and 11.8% (real 8.7% and 3%). The difference of 7.5 percentage points.

In October 1999 the rediscount rate came to 16%.

In December 2000 the interest rate reached the level of 22% (bill rate), (discount rate -23%) — a significant growth indeed.

In October 1999 the zloty-euro exchange rate remained at 4.40 level, in October 2000, at 3.90, and in May 2001, at 3.40. The graph indicates that there was a breakthrough in the tendency for appreciation.

Even a cursory examination of the data and comparing it with the description of the overshooting-a model of exchange rate determination shows that there is a high probability of the occurrence of the overshooting-a result in Poland’s economy.

Summary

The aim of this paper is expanding Dornbusch’s overshooting result upon analogous results which can occur on the appreciations side of exchange rate.

The paper consists of three parts.

• The first presents the place of the overshooting in the theories of exchange rate determination.
• The second discusses the overshooting model and results of exchange rate appreciations.
• The overshooting consequence is subject to empirical verification of the fluctuations in exchange rates of Polish Zloty in 1999-2000 in the last part of the paper.