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EVIDENCES OF THE INTENSITY OF THE BALASSA-SAMUELSON PHENOMENON IN THE ROMANIAN ECONOMY*

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The paper presents some results revealing the existence of the Balassa-Samuelson effect in Romania as well as some estimates of its impact on inflation, appreciation of the real exchange rate and rising competitiveness of the Romanian economy.

Keywords: *Balassa-Samuelson effect, exchange rate, inflation, competitiveness.*

JEL: *F33;O23;O24; O47.*

During the transition to market economy, most CEE countries saw a significant increase in productivity, especially in industry. But this evolution was accompanied by an even faster rise in prices in the non-tradable sector than in the tradable sector and by the appreciation of the real exchange rate.

The above phenomena, specific to economies in transition, correspond to situations analysed by Balassa (1964) and Samuelson (1964) four decades ago. Generally, the rise in productivity is higher in the tradable sector than in the non-tradable one. Since wages tend to be equal in the two sectors, a faster rise in productivity in the tradable sector brings on higher wages in all economy. Consequently, the relative prices will rise in the non-tradable sector. If productivity rises faster in a country than in a partner country, then the inflation will also be higher in the considered country than in the partner country. This will cause the appreciation of the real exchange rate. The process described above is known as the Balassa-Samuelson effect.

In the last years, several models and econometric techniques have been developed for identifying how the phenomenon takes place and how it influences both the inflationary process and the appreciation of the exchange rate. To identify the intensity of the Balassa-Samuelson effect, many studies have been conducted both on developed countries and on transition countries (Romania, Czech Republic,

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Poland, Hungary and the Baltic countries, etc.).

Analysing the influence of the productivity differential on inflation, Egert (2001) concluded that in the Czech Republic, Slovenia and Slovakia the Balassa-Samuelson phenomenon caused a rise in inflation of about 1.5 percentage points. In Hungary and Poland, the Balassa-Samuelson effect was stronger and caused a rise in inflation of about 3.8 percentage points. As for Romania, Egert (2004) estimated a rise of 1.43 percentage points.

Other authors have also come to similar conclusions. Halpern and Wyplosz (2001) estimated that between 2 and 3 percentage points of inflation in transition countries were due to the Balassa-Samuelson phenomenon. Jabzec (2002) estimated that between 1993 and 2001, about 1.5 percentage points of inflation in Slovenia (considering Germany as a benchmark) were due to the productivity differential.

There are several studies based on panel-type data, dealing simultaneously with a larger number of countries, including Romania. Among them we find the studies conducted by Begg, Halpern and Wyplosz (1999), DeBroeck and Slok (2001) and Dobrinski (2001). These studies deal with the effect of productivity differential on the real exchange rate. The study conducted by Halpern and Wyplosz in 2001 presents wage equalisation in the tradable and non-tradable sectors and quantifies the effect of the productivity differential on inflation. The authors come to the conclusion that it is about 1.2 percentage points.

Admitting the truth that sustainable growth of labour productivity in the tradable sector is a *sine qua non* condition for catching-up, that is for approximating to the EU's average GDP per capita, it is worth mentioning that it also causes the amplification of the inflation differential as against the EU area.

Further, we present several results concerning the presence of the Balassa-Samuelson effect in Romania and estimates of its impact on inflation, appreciation of real exchange rate, and rise in competitiveness in the Romanian economy.

As mentioned above, the Balassa-Samuelson model is based on some fundamental hypotheses. According to the first one, the economy consists of two large sectors: *tradable sector,* producing exportable goods, and *non-tradable sector,* producing goods and services non-tradable for export. The second hypothesis regards the integration of foreign trade activities, that is the price of exportable goods is set on the international market. The integration of foreign trade activities requires the removal of trade and tariff barriers. According to the above hypotheses, the purchasing power parity (PPP) for the tradable sector is checked both in absolute terms and in relative terms. Dynamics of wages is determined by the evolution of productivity in the tradable sector. According to other hypotheses of the model, wage levels in the tradable sector are approximately equal to those in the non-tradable sector. One of the factors explaining the approximation of wages in the two sectors is labour mobility in economy. In other words, if wages are higher in one sector than in the other, the employees put pressure on the wage level by migrating to the sector providing higher wages.

The tradable sector is the essential "driving force" for catching-up. The rise in productivity in the tradable sector is generally higher than in the non-tradable sector. Increasing productivity in the tradable sector will cause a rise in wages in this sector. In turn, these wages will further cause a rise in wages in the non-tradable sector. Since the rise in wages in the non-tradable sector is determined by the need to align wages to the level of the tradable sector and not by an effective rise in productivity, it is obvious that a rise in prices will occur in the non-tradable sector. Taking also into account that the PPP rule is only valid for exportable goods, we may conclude that the consumer price index (CPI) increases especially through the non-tradable sector.

The essential outcome of the Balassa-Samuelson model is that if the productivity differential in the national economy exceeds the one in the partner economy, then a higher inflation in the non-tradable sector of the national economy will turn into a higher inflation in the whole national economy, and the real exchange rate will appreciate.

Table 1 shows the classification by tradable and non-tradable sectors, in accordance with various studies. Distinguishing between tradable and non-tradable sectors in Romania, as in every country, is quite difficult. The ideal procedure would be to base the distinction between tradable and non-tradable on the analysis of each good.

Table 1

Classification of sectors into tradable and non-tradable for transition economies

	Classification by sectors	
Authors and studied country	*Tradable*	*Non-tradable*
Arratible (2002) 10 candidate countries to EU	Processing (manufacturing) industry	Not considered
Halpern and Wyplosz (2001) 8 candidate countries to EU, Russia	Industry	Services
Fischer (2002) 10 candidate countries to EU	Industry	Services
Egert (2002) 12 candidate countries to EU	Industry	Not considered
DeBroeck and Slok (2002) 25 transition countries	Industry and constructions	Services
Simon and Kovács (1998) Hungary	Manufacturing	Services (except public administration)
Rother (2000) Slovenia	Manufacturing	The rest of the economy
Jazbec (2002) Slovenia	Industry	Services
Harjes (2003) Romania	Industry	Not considered

An in-depth analysis of the definition of tradable and non-tradable sectors is provided by Kinght and Johnson (1997). Several studies[1] use the share of each group of products in the total exports as an indicator for estimating the tradability of various groups of products. According to Halpern and Wyplosz (2001), if over 10% of the production of a sector is provided for export, then that sector is considered tradable.

Since 90% of the goods exported by Romania are industrial, we assume that the tradable sector is, in fact, the industry branch. As for the non-tradable sector, it consists of the services branch. In Romania, the service sector includes transport and storage, post and telecommunications, trade, hotels and restaurants, financial, banking and insurance activities, real estate transactions, renting, services especially business services, public administration, education, health and social assistance.

As for the Euro Area, services include trade, hotels and restaurants, transport and communications, financial intermediation, real estate transactions, other services. The selection of the two sectors is similar to the one used in other studies on various countries in transition (Table 1).

The modelling of the Balassa-Samuelson effect is based on comparisons with a country or a group of countries considered "benchmarks". The selection is made in accordance with the structure of foreign trade by countries. Since most of the Romanian foreign trade is oriented towards EU countries, the benchmark is the Euro Area. The share of trade with the EU in the total Romanian foreign trade rose from about 20% at the beginning of the transition to almost 70% at present. The selection of the Euro Area as benchmark is also justified by Romania's concern about filling the gap with the Euro Area countries.

To analyse the model of the Balassa-Samuelson effect on Romania, we used statistical data on the evolution of labour productivity, evolution of relative prices of non-tradable goods, dynamics of the real exchange rate computed by means of the consumer price index (CPI). They are quarterly data concerning the period 1995:Q1-2005:Q[2]. All data are based on the natural logarithm and seasonally adjusted in accordance with characteristics of each series[3].

The selection of the analysis period was dependent on available statistical data. The data sources were the National Bank of Romania and the European Central Bank, and Eurostat for data concerning the Euro Area. For data aggregation for the service sector in the Euro Area, we used, as weights, the gross value added of each sector.

An important element for quantifying the Balassa-Samuelson effect is the *total factor of productivity*. In general, if the function of macroeconomic production

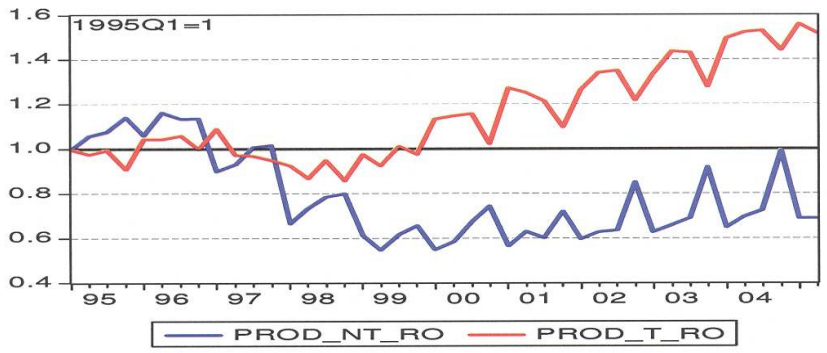
[1] For example, Giovannini, de Gregorio and Wolf (1994).

[2] For the period before 1999, we took into account the ROL/ECU rate.

[3] Seasonal adjustments are based on the Tramo-Seats method. The use of adjusted seasonal data could influence the dynamic modelling (Ericsson, Hendry and Tran (1994)). The Tramo-Seats method – unlike other methods of seasonal adjustment – is more suitable since results are better in case of extreme values or structural changes (outliers).

was separately estimated for the tradable sector and the non-tradable sector, the factor is equal to the so-called Solow residue. As for Romania, the functions of macroeconomic production are hardly identifiable due to the scarcity of data on the capital stock. In this case, we used average labour productivity as proxy.

Figure 1 shows the evolution of labour productivity in the tradable sector and the non-tradable sector in Romania. One may notice that productivity in the tradable (industry) sector rose at a higher rate than in the non-tradable (industry) sector. The rise in productivity in industry was mostly caused by continuous diminution in number of employees, especially due to the sector restructuring.



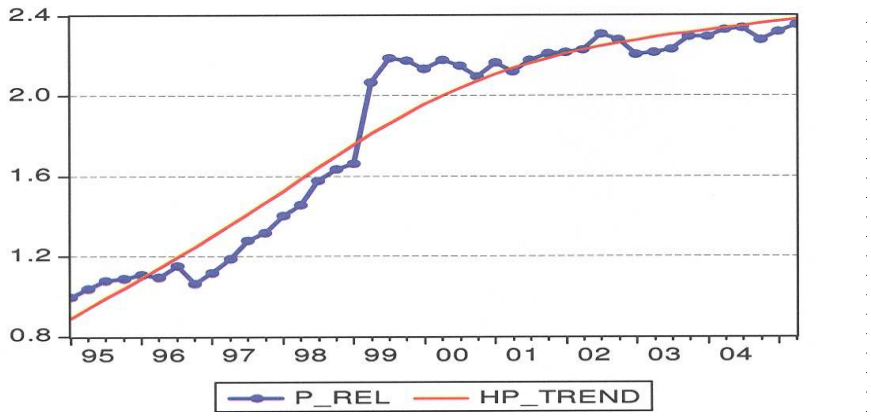
Source: Authors' computation.

Figure 1. Labour productivity in Romania in tradable and non-tradable sectors – fixed base index.

Figure 2 presents the dynamics of relative prices in the non-tradable sector in comparison with the tradable sector. For prices in the non-tradable sector we used as proxy the consumer price index of services, and for prices in the tradable sector we used as proxy the consumer price index of non-services. In both sectors, prices rose quickly, and the gap widened since 1997. This was caused by faster rise in prices in the service sector than in industry. Therefore, the relative rise in prices in the non-tradable sector was faster between 1997-1999, and then the ratio became stable between 2 and 2.3.

The Balassa-Samuelson model is based on several hypotheses concerning the structure of the economy, which must be confirmed for each case. These hypotheses refer to the free movement of capital across countries and free movement of labour within an economy.

As we know, Romania adopted total convertibility of current account in 1998, liberalized medium and long-term inflows of capital in 1999, and since the 1st of January 2003, the transactions in foreign transferable securities of Romanian residents have no longer been subject to authorisation by the NBR. Also, since April 2003, Romania has permitted free-access of non-residents to bank deposits in lei.



Source: Authors' computation.

Figure 2. Relative prices in Romania: non-tradable prices/tradable prices.

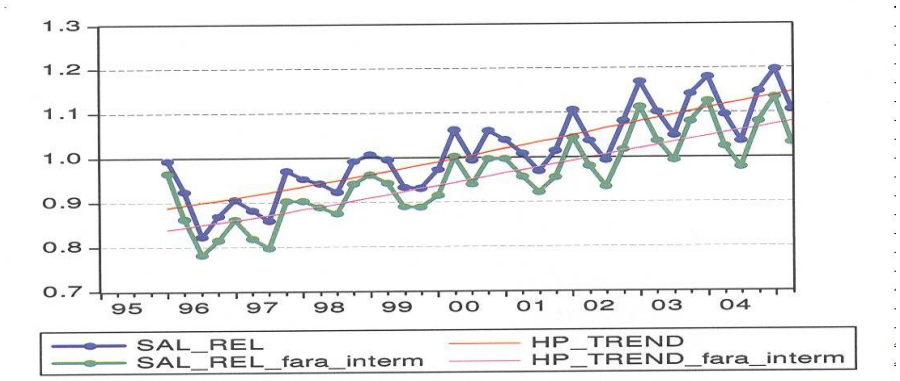
Further, we deal with the way in which wages in the tradable and non-tradable sectors tend to become equal. As shown in Figure 3., nominal gross wages in the services sector rose faster and exceeded the wages in industry, although they were initially lower. The above equalisation can be explained by the fact that the presence of strong trade unions in the services sector (especially in the sector of public utilities) led to successful negotiations for wage rise.

Sectoral analysis reveals that the highest rise in wages occurred in the financial intermediation sector (financial, banking and insurance activities) as well as in the post and telecommunication sector. Wages in the two sectors are much above the economy average, which substantially contributed to their equalisation. Elimination of the financial intermediation sector from the non-tradable branch renders the wage equalisation more evident; relative wages tend to approximate to 1 (Figure 3).

The results of the econometric tests concerning the existence of unit root reveal that the series used to analyse the Balassa-Samuelson effect in Romania are non-stationary for the level and stationary for the first difference. Non-stationarity of data series requires the use of the Johansen multivariate procedure to identify the presence of a long-term stationary relation (co-integration) between these non-stationary series.

Econometric estimates were made at several stages on the basis of Egert's methodology (2002f). First, we studied the relation between the productivity differential between the tradable sector and the non-tradable sector and the relative (non-tradable–tradable) prices of the two sectors of the Romanian economy. Since a long-term relation between the two variables was identified, we proceeded to the analysis of the relation between the productivity differential and the appreciation of

the real exchange rate. For this purpose, we tested the relation between the productivity differential between Romania and the Euro Area and the productivity differential in relative prices between Romania and the Euro Area. Finally, we tested the relation between the differential in relative prices between Romania and the Euro Area and the real exchange rate.



Source: Authors' computation.

Figure 3. Relative wages, with or without the financial intermediation sector.

Econometric procedures of co-integration combined with Hodirick-Prescott (HP) filters proved that inflation caused by the Balassa-Samuelson effect ranged between 1.14 percentage points in 1995 and 1.82 percentage points in 2003. Table 2 shows the inflation caused by the Balassa-Samuelson effect in each year between 1995-2004.

Table 2

Annual inflation caused by Balassa-Samuelson effect in Romania

Year	Inflation caused by B-S effect (%)
1995	1.14
1996	1.19
1997	1.30
1998	1.49
1999	1.67
2000	1.82
2001	1.74
2002	1.77
2003	1.82
2004	1.78
Average	**1.57**

Source: Authors' computation.

The results concerning the influence of the Balassa-Samuelson effect on the appreciation of the real exchange rate are shown in Table 3. Our results are similar to results obtained by Halpern and Wiplosz (2001), who established – using panel data – that the real "equilibrium" appreciation of the exchange rate was, on the average, 3% a year.

Table 3

Real appreciation of exchange rate, associated with Balssa-Samuelson effect

Year	**Exchange rate appreciation caused by B-S effect (%)**
1995	1.18
1996	1.23
1997	1.37
1998	1.71
1999	2.09
2000	2.47
2001	2.54
2002	2.57
2003	2.63
2004	2.57
Average	**2.03**

Source: Authors' computation.

To fully explain real appreciation of the exchange rate by the Balassa-Samuelson effect, the theory of purchasing power parity should be checked for the real exchange rate computed on the basis of tradable prices. In other words, the exchange rate deflated by tradable prices should be stationary and trendless. But econometric estimates showed that the rate was non-stationary.

BIBLIOGRAPHY

1. Arratibel, O., D. Rodriguez Palenzuela and C. Thimann (2002), "Inflation dynamics and dual inflation in accession countries: A "New Keynesian" perspective", ECB Working Paper No. 132.
2. Balassa, B. (1964), "The Purchasing-Power-Parity Doctrine: A Reappraisal", *Journal of Political Economy*, Vol. 72. No 6., December, pp. 584-596.
3. Begg, D., L. Halpern and C. Wyplosz (1999), "Monetary and Exchange Rate Policies, EMU and Central and Eastern Europe", Forum Report on the Economic Policy Initiative No. 5, CEPR, London.
4. De Broeck, M. and T. Slok (2001), "Interpreting Real Exchange Rate Movements in Transition Countries", IMF Working Paper No. 56, May, Washington D.C.
5. Dobrinsky, R. (2001), "Convergence in Per Capita Income Levels, Productivity Dynamics and Real Exchange Rates in the Candidate Countries on the Way to EU Accession", International Institute for Applied Systems Analysis, Interim Report No. 38.
6. Égert, B. (2001a), "Exchange Rate Regime and Disinflation in the Transition: The Experience of the pre-announced Crawling Peg in Hungary", *Revue d'économie financière*, No. 69 (2), Special Issue: Ten Years of Transition in Eastern European Countries, pp. 361-379.

7. Egert, B. (2001b) "Estimating the impact of the Balassa-Samuelson effect on inflation during the transition: does it matter in the run-up to EMU?", Paper presented at the "East European Transition and EU Enlargement: A Quantitative Approach" meeting in Gdansk.
8. Égert, B. (2002c), "Does the Productivity-Bias Hypothesis Hold in the Transition? Evidence from Five CEE Economies in the 1990s", Eastern European Economics, Vol. 40, No. 2., March-April, pp. 5-37.
9. Égert, B. (2002d), "Estimating the Impact of the Balassa-Samuelson Effect on Inflation and the Real Exchange Rate During the Transition", Economic Systems, 26(1), pp. 1-16.
10. Égert, B. (2002e), "Investigating the Balassa-Samuelson Hypothesis in the Transition: Do We Understand What We See? A Panel Study", Economics of Transition, 10(2), July, pp. 1-36., and Bank of Finland BOFIT Discussion Paper No 6/2002.
11. Égert, B. (2002f), "Nominal and real convergence in Estonia: The Balassa-Samuelson (dis)connection. Does disaggregation provide better understanding?", National Bank of Estonia.
12. Fischer, C. (2002), "Real currency appreciation in accession countries: Balassa-Samuelson and investment demand", Economic Research Centre of the Deutsche Bundesbank, Discussion paper 19/02.
13. Halpern, L. and C. Wyplosz (2001) "Economic Transformation and real exchange rates in the 2000's: The Balassa-Samuelson Connection", UNECE working paper.
14. Harjes, T. (2003), "An assessment of the real exchange rate in Romania", IMF country report for Romania.
15. Jazbec, B. (2002), "Balassa-Samuelson effect in transition economies: The case of Slovenia", William Davidson Institute Working Paper No. 507.
16. Knight, G. and L. Johnson (1997), "Tradables. Developing Output and Price Measures for Australia 's Tradable and Non-tradable Sectors", ABS Working Paper No. 97/1.
17. Rother, C. P. (2000), "The Impact of Productivity Differentials on Inflation and the Real Exchange Rate: An Estimation of the Balassa-Samuelson Effect in Slovenia", IMF Country Report, Republic of Slovenia: Selected Issues, 00/56.
18. Samuelson, P. (1964), "Theoretical Notes on Trade Problems", *Review of Economics and Statistics*, 2, pp. 145-54.