BANK OF ALBANIA

AN ESTIMATION OF BALASSA-SAMUELSON EFFECT IN ALBANIA

SEPTEMBER, 2007

EVELINA ÇELIKU, RAJNA HOXHOLLI*

CONTENTS

***

The authors are grateful to colleagues of the Monetary Policy Department and the Research Department, for their comments and suggestions during the discussion of this material. Special thanks go to Mr. Dubravko Mihaljek (BIS) and Mr. Marc Klau (BIS) for the provision of processed data from the Euro area and for the encouragement given while working with this paper.

***

ABSTRACT

The purpose of this paper is to verify the presence of Balassa – Samuelson effect and estimate it for Albanian economy. Investigation of Balassa-Samuelson (BS) constitutes an important aspect for the monetary policy pursued by central banks, because it lays emphasis on the relation between relative productivity of tradable to non-tradable sectors of a small and open economy and relative prices of both sectors. Theoretically, the presence of a positive relation would support the fact that inflation is influenced by relative productivity growth. Making use of econometric models, this paper estimates the domestic and foreign BS effect on inflation. In order to carry out the estimations, data on value added and employees' number in the economy sectors are made use of. Various proxies for productivity of tradable and non-tradable sectors of the economy are estimated through them. Also, proxies for various relative prices and different classifications of the economy sectors are employed to fully test the BS effect. The results indicate that there exists a positive correlation between relative productivity and relative prices, a fact that supports the research on BS effect in Albania. Quantitative estimates indicate that this effect has had a moderate impact on inflation. The material displays also the results of a more specific model of this effect on real exchange rate trend. Co-integration analysis between REER and relative productivity differential concludes that in the long-run, the implications are more obvious on the REER. It is assessed that shocks only from productivity differentials lead to disequilibrium of the REER, which may return to equilibrium after a relatively long period. The results of the study help exploring the model of the general exchange rate equilibrium in Albania.

Key words: Balassa-Samuelson effect, relative productivity and prices, real exchange rate.

1. INTRODUCTION

An important issue of broad discussion for transition countries is whether inflation is a pure monetary phenomenon, whether it reflects the productivity growth differential between tradable and non-tradable sectors of the economy or whether it is a combination of both effects simultaneously. Today the problem is extended over a broader plan: to what extent the productivity growth in the economy is reflected to inflation and real exchange rate performance (REER)? This issue has been in the focus of economists, to estimate the degree of convergence of transition economies during their run-up to European Union accession. The implementation of policies for maintaining price stability, and in this framework, for controlling inflationary pressures, in order to meet the Maastricht criteria, is regarded as an important process for central banks. This is so because the implementation of policies that intend one-sided reduction of inflation may slowdown the economic growth and the overall economic development (Olters, 2005). Various studies have used the Balassa-Samuelson (BS) theory to estimate the process of price adjustment.

The study of the BS effect is important even for other transition economies, because it closely implicates the way the monetary policy is implemented. The case of rising inflation and steady exchange rate appreciation as a result of productivity growth would not require the taking of strict measures by monetary policy, in order to restrain it. The opposite would occur, if these phenomena were verified in the absence of relative productivity growth.

In this aspect, Albania constitutes an attractive case for studying the correlation between relative productivity and relative prices, using the BS theoretical framework. Albania was expected to experience a very large growth of productivity while moving towards market economy. Given that its overall development level lagged largely behind that of advanced economies, there was a great potential for productivity convergence between Albania and advanced economies. Moreover, the avoidance of distortions inherited from the extremely centralized and closed economy, was expected to bring about additional productivity growth, taking into

account that under central planning administration, the production level had been lower than that of other economies.

The paper is structured as follows: Section 2 presents the theoretical framework and hypotheses on which the presence of the BS effect is set up. Section 3 explains the economic rational behind the domestic and international BS effect, and its impact on the inflation and real exchange rate trends. Variables and importance of having a reliable database for studying the phenomenon, particularly in Albania's case, are dealt with in Section 4. The study of the presence of base hypotheses, as prerequisites for the existence of the BS effect in Albanian economy and the results of estimations from econometric models are provided in sections 5 and 6, respectively. Section 7 brings the main conclusions related to this research.

2. THEORETICAL BACKGROUND ON THE BALASSA – SAMUELSON

Balassa and Samuelson (1964), independently provided a theoretical approach, intended to explain relative price and real exchange rate movements in a country due to supply-side factors. In its core, a larger productivity growth in transition economies may contribute to a higher inflation in these countries and to an appreciation of the RER. Keeping to this concept, the productivity growth differential between two countries affects the RER through the tendency to get wages equalized between sectors and relative price differentials. This phenomenon is known as Balassa – Samuelson (BS) effect. In the simplest model, the BS effect may be explained as an impact on consumer prices of a small country, due to productivity growth in tradable (T) sector. Productivity growth would not lead to decreased prices in this sector, (a perfect competition is assumed), since prices of the tradable sector are determined in the world market. However, productivity growth will drive up real wages of the tradable sector. Due to wage equalizing tendency, assuming perfect labour mobility among sectors in the long run, non-tradable prices will go up, in order to face additional costs of wage rise in this sector.

Researches over the last decade on BS effect for various countries, have contributed to assessing the inflation structural model and exchange rate equilibrium. The theoretical framework of the BS effect includes the estimation and testing of certain relationships, where each of them constitutes a certain degree of researching on the effect. They include:

a) The relationship between relative productivity differential of the tradable sector versus the non-tradable sector of the economy and relative price differential of non-tradables versus tradables – within a country. This is known as the Baumol –Bowen (BB) effect.
b) The relationship between relative productivity differentials of the tradable sector versus the non-tradable sector between a certain economy and foreign economies and developments in relative prices (NT/T) and in real exchange rate - in other words, this relationship has to do with a more complete model, known as the BS effect;
c) The long-run relationship between developments in real exchange rates and the BS effect. The discovery of this relationship contributes to the study of underlying equilibrium of the real exchange rate, constructing a more elaborated BS model. The latter permits the involvement of other fundamental variables, such as government expenditures, capital flows, and other explanatory variables.

This paper tries to discover the BB and BS effect, through links (a) and (b). The second relationship, which captures the BS effect in the domestic economy relative to the euro area economy, is estimated according to two approaches. The first is based on the model treated by Mihaljek and Klau (2003), and Égert (2002), whereas the second is based on the model treated by Loko and Tuladhar (2005), through which it is aimed at estimating the role of the BS effect on appreciating the REER trend. The above observations shed light, first of all, on the fact whether there has been a domestic and international BS effect in the Albanian economy during the 1998 – 2006 period. In a more advanced step, the conclusions drawn from the application of the second relationship, have been used to study the role of the long-run BS effect in real exchange rate trends. The

conclusions drawn from this model support the verification of one of the base hypotheses for studying the exchange rate equilibrium in Albania.

The domestic impact of the BS (a) effect discovers the relationship between productivity differential of tradable versus non-tradable sectors and relative prices of non-tradable goods versus tradable goods of a country. Schematically, this relation would be provided as follows:

$$\frac{prod_T}{prod_{NT}} \Rightarrow \frac{P_{NT}}{P_T} \qquad (2.1)$$

where: T- denotes the tradable sector; NT – the non-tradable sector; prod – total productivity of production factors; P– the price level.

Different researchers (Coricelli and Jazbec, 2001; Halpern and Wyplosz, 2001), have tried to model the RER, using the domestic BS effect. But, such a modelling may generate distorted results, because relative prices of non-tradable goods relative to tradable goods influence only the domestic allocation of factors in the economy of the country, assuming the latter as isolated from foreign relations.

In order to fill in this gap, the study of the international effect through link (b) comes to assistance, with the RER entering the game. The literature presents two possibilities for carrying out the study of this link. The first and the simpler one is used by Colinelli and Orsi (2001) to model inflation in candidate countries for EU accession. According to it, the relation between productivity differentials across countries and the real exchange rate may be estimated according to the following relation:

$$\frac{prod_T}{prod_{NT}} \div \frac{prod_T^*}{prod_{NT}^*} \Rightarrow RER \qquad (2.2)$$

where, the asterisk (*) is used for the relevant variables of foreign countries.

According to this method, incorrect conclusions may be drawn, since it regards the relationship between productivities and relative prices as merged to REF, a single link.

To prevent this problem, Égert (2002) presented a more elaborated method. According to it, the relation between productivity and relative prices and the one between relative prices and real exchange rate may be studies in a more detailed way, based on the following relation:

$$\frac{prod_T}{prod_{NT}} \div \frac{prod_T^*}{prod_{NT}^*} \Rightarrow \frac{P(T)}{P(NT)} \div \frac{P(T^*)}{P(NT^*)} \Rightarrow RER \qquad (2.3)$$

Both (a) and (b) links are known respectively as a simple and complete framework of the BS effect. Their assessment is made under the conditions when some base hypotheses are verified or assumed as real. The hypotheses or main assumptions may be grouped as follows:

- A country's economy is regarded as divided into two sectors: the tradable and non-tradable sectors, which produce respectively tradable and non-tradable goods[1];
- The assumption of absolute and relative purchasing power parity (PPP) is verified for tradable goods. Due to trade integration, the tradable prices are assumed to be determined in the international market. Trade integration implies prevention of trade barriers in the form of administrative and qualitative restrictions. Consequently, wages in the tradable sector are related to the level of productivity in this sector;
- Productivity of the economy should be higher in the tradable sector than in the non-tradable one. Productivity differential becomes the basis for the wage and price chain differentials in relevant sectors;
- Wages are assumed equal in both sectors, or at least they present equalizing trends in a long run. One of the factors that promotes wage equalization between the sectors is the perfect labour mobility at home and abroad. Another factor that encourages wage equalization between the sectors is the participation of trade unions in the economy. The more present

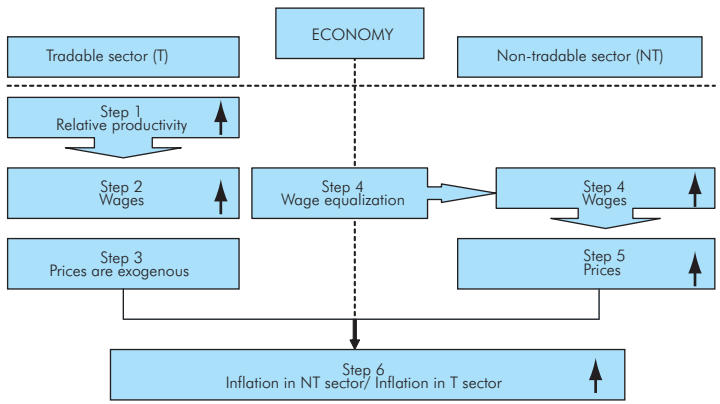
these structures are, the more the wages among economy sectors tend to equalize.

3. BALASSA – SAMUELSON MODEL

3.1 BS DOMESTIC EFFECT

The structural inflation model may be studied in the BS framework. This theory tries to relate the changes in the overall price level to the changes in the total production factors in tradable and non-tradable sectors[2]. The traded goods sector has a higher productivity growth than the non-traded goods sector, given that traded goods sector uses the capital more intensively and is more exposed to competitiveness. Productivity growth in this sector would bring about real wage rise. In the long run, higher wages in the tradable sector will serve as a driver for attracting labour force to this sector. Non-tradable sector producers, wanting to keep the labour force, are bound to raise wages in this sector. This wage rise carries over artificial elements, because it is not fully justified by productivity growth in the non-tradable sector of the economy. This constitutes an additional cost, which will be reflected in the final non-tradable prices. Taking into account that the "law of one price" operates in small open economies[3], the overall domestic price level would rise.

Scheme 1. BB effect



According to Kuzmina and Lobakovs (2004), the BB effect may be schematically presented as follows:

The relationship between productivity differential and relative price differential may be obtained through the Cobb-Douglas production function with constant income for both sectors:

$$Y_T = A_T L_T^{(1-\gamma)} K_T^{\gamma} \quad (3.1.1)$$

$$Y_{NT} = A_{NT} L_{NT}^{(1-\delta)} K_{NT}^{\delta} \quad (3.1.2)$$

where, A, L and K denote: total productivity of factors of production; labour input; capital of tradable and non-tradable sectors, respectively. Trade balance is assumed zero, a fact that may be real in the long run.

Assuming perfect competition, factors of production and prices are taken as determined in advance. So, the firms choose capital and labour for profit maximization. Factor prices tend to get equalised, assuming perfect mobility of labour and capital across them. Profit maximisation problem of a firm is presented as follows:

$$\prod_T = A_T L_T^{(1-\gamma)} K_T^{\gamma} - WL_T - RK_T \quad (3.1.3)$$

$$\prod_{PT} = P_{NT} A_{NT} L_{NT}^{(1-\delta)} K_{NT}^{\delta} - WL_{NT} - RK_{NT} \quad (3.1.4)$$

where, W is the wage rate and R is the rental rate on capital. We estimate $k=K/L$ and find the first derivate:

$$A_T(1-\gamma)(k_T)^{\gamma} = W \quad (3.1.5)$$
$$P_{NT} A_{NT}(1-\delta)(k_{NT})^{\delta} = W \quad (3.1.6)$$
$$A_T \gamma (k_T)^{(\gamma-1)} = R \quad (3.1.7)$$
$$P_{NT} A_{NT} \delta (k_{NT})^{(\delta-1)} = R \quad (3.1.8)$$

Assuming perfect capital mobility, R is an exogenous variable, as it is the rental rate on capital (determined in the world market). The equations (3.1.5) - (3.1.8) represent a system of four equations in 4 unknowns (P_{NT}, W, k_{NT}, K_T).

To solve this system, we express the equation (3.1.7) depending to k_T:

$$k_t = \left(\frac{\gamma A_t}{R}\right)^{\frac{1}{1-\gamma}} \tag{3.1.9}$$

Then we find the wage rate, substituting equation (3.1.9) into (3.1.5):

$$W = (1-\gamma) A_T^{\frac{1}{1-\gamma}} \left(\frac{\gamma}{R}\right)^{\frac{\gamma}{1-\gamma}} \tag{3.1.10}$$

Substituting (3.1.10) into (3.1.6), we obtain:

$$k_{NT} = \left[\frac{(1-\gamma) A_T^{\frac{1}{(1-\gamma)}} \left(\frac{\gamma}{R}\right)^{\frac{\gamma}{1-\gamma}}}{(1-\delta) P_{NT} A_{NT}} \right]^{\frac{1}{\delta}} \tag{3.1.11}$$

To find the relative prices of NT goods to T goods, we substitute (3.1.11) into (3.1.8):

$$P_{NT} = \frac{A_T^{\frac{(1-\delta)}{(1-\gamma)}}}{A_{NT}} C R^{\frac{(\delta-\gamma)}{(1-\gamma)}} \tag{3.1.12}$$

where C is a positive constant.

Transforming the equation terms in the logs and applying the condition of constant returns to scale, one obtains the following equation:

$$P_{NT} = (a_{NT} - a_T) + c \tag{3.1.13}$$

or

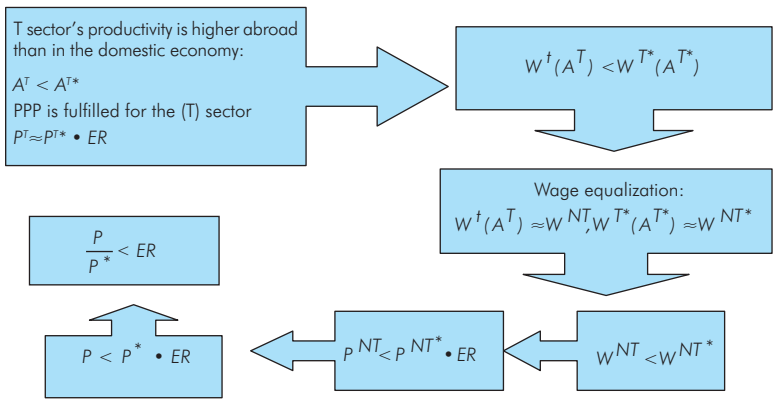
$$(p_{NT} - p_T) = f(a_T - a_{NT}) \tag{3.1.13/a}$$

This relation represents the final form of the domestic BS effect. However, along the time, relative price developments in non-tradable goods depend mostly on technology advances.

3.2 INTERNATIONAL BS EFFECT: THE RELATIONSHIP BETWEEN RELATIVE PRODUCTIVITIES ACROSS COUNTRIES AND EXCHANGE RATE DEVELOPMENTS

The BS effect for a certain country assumes a broader economic sense when foreign relations of that country are incorporated in the estimate. Productivity level of the tradable goods sector is much lower in the developing countries than in the developed countries. Because prices are considered exogenous and wages are assumed to be a function of the level of productivity, it results that the wage rate dominating the tradable sector of the developing country is much lower than the wage rate of the same sector in the developed countries. Due to the long-term process of wage equalization bias across sectors, the wages in the non-tradable sector are comparable to those of the tradable sector. Consequently, non-tradable price level will be lower in developing countries than in developed countries, a trend that would be reflected also in the overall price level: they would be lower in a developing country than in a developed country. Making a summary, the international BS effect based on the Égert (2003) chart is provided as follows:

Scheme 2. International BS effect



If the base hypotheses of the model are fulfilled and the equation (3.1.13) is verified even for the foreign country, the relationship between relative productivity and relative prices may be obtained

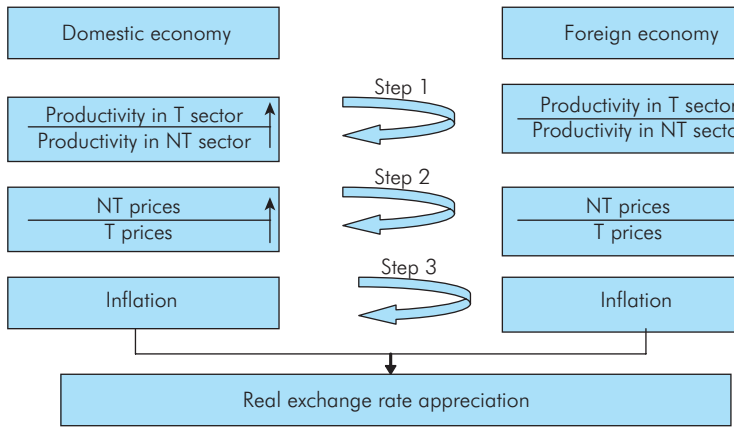
by using another variant of the equation (3.1.13/a), which is given by the equation:

$$(p_{NT}-p_T) - (p_{NT}^*-p_T^*) = f(a_T-a_{NT}) - (a_T^*-a_{NT}^*) \qquad (3.2.1)$$

3.2.1 International BS effect and real exchange rate dynamics

The international BS effect contributes to explaining the appreciating trend of the real exchange rate. It reveals how productivity growth, translated into domestic inflationary pressures, impacts on the real exchange rate. The dynamics of this effect, according to Kuzmina and Lobakovs (2004), is presented at scheme 3. In compliance with the theoretical framework of the BS effect, the domestic economy is expected to be a developing economy[4], whereas the foreign economy is that of a developed country[5]. If the productivity differential growth (T/NT) is higher in the domestic economy than in the foreign country, thanks to the mechanism through which the international BS effect operates, the domestic relative prices of non-tradable goods are higher than their benchmark in the foreign economy. Higher prices of non-tradable goods are transmitted to the overall domestic inflation and drive CPI movements, causing real exchange rate appreciation of the national currency, when the PPP condition is relatively fulfilled.

Scheme 3. BS effect on real exchange rate trend



The assumption on the PPP presence for tradable goods sector may be verified through an indirect way. To this end, first the BS theory approach relative to REER is clarified, through the following formulae:

$$REER = E^* \frac{P^*}{P} \qquad (3.2.1)$$

Calculating both sides of (3.3.1), one obtains the following:

$$\log(REER) = \log(E^* \frac{P^*}{P}) \qquad (3.2.2)$$

After applying the log, the respective terms of expression (3.2.2) will be provided with lower case letters, respectively: e, p and p^* at expression (3.2.3) of this sub-section.

$$q = e + p^* - p \qquad (3.2.3)$$

Consumer Price Index for every country may be expressed with the following expressions:

$$p = \alpha p_T + (1 - \alpha) p_{NT} \qquad (3.2.4)$$

$$p^* = \alpha^* p^*_T + (1 - \alpha^*) p^*_{NT} \qquad (3.2.5),$$

where, α is the share of tradable goods in the CPI basket of goods and services for the respective countries. Substituting (3.2.4) and (3.2.5) at (3.2.3), the REER may be expressed in goods and services price function, according to tradable and non-tradable sectors.

$$q = e + [\alpha^* p^*_T + (1 - \alpha^*) p^*_{NT}] - [\alpha p_T + (1 - \alpha) p_{NT}] \qquad (3.2.6)$$

$$q = (e + p^*_T - p_T) + [(1 - \alpha)(p_T - p_{NT}) - (1 - \alpha^*) p^*_T - p^*_{NT})] \qquad (3.2.7)$$

Frequently, in order to simply treat theoretically and practically the estimation of the BS effect, it is assumed that $\alpha = \alpha^*$ and the expression (3.2.7) is reduced into:

$$q = (e + p^*_T - p_T) + \{(1-\alpha)[(p_T - p_{NT}) - (p^*_T - p^*_{NT})]\} \qquad (3.2.8)$$

Whereas, as a growth rate, (3.2.8) would be expressed as:

$$q' = (e'+p^*_T{}'-p_T')+\{(1-\alpha)[(p_T'-p_{NT}')-(p^*_T{}'-p^*_{NT}')]\} \qquad (3.2.8')$$

The recent studies (Mihaljek, Klaus, 2003) estimate the BS effect that takes into account the respective weights of the T/NT sectors at the goods basket, i.e., they apply the complete variant (3.2.7). This is so, because for baskets with considerable differences in these weights, the assumption $\alpha = \alpha^*$, would bring about negotiable estimations of the BS effect. Therefore, in Albania's case, we would consider $\alpha \neq \alpha^*$.

As a growth rate, the expression (3.2.7) would be rewritten as follows:

$$q'=(e'+p^*_T{}'-p_T')+[(1-\alpha)(p_T'-p_{NT}')-(1-\alpha^*)[(p^*_T{}'-p^*_{NT}')] \qquad (3.2.7')$$

In the expression (3.2.7') and in its analogues, the part $(e'+p^*_T{}'-p_T')$ represents the relative prices of the tradable sector in the domestic country versus those in the foreign country, simply referred to as the impact on the REER by the T sector.

The residual term, $[(1-\alpha)(p_T'-p_{NT}')-(1-\alpha^*)[(p^*_T{}'-p^*_{NT}')]$ represents the relative price differential of tradables versus non-tradables, in the domestic country versus those in the foreign country. This term is almost equivalent to the relative productivity differential and tries to capture the BS effect (Loko and Tuladhar, 2005). For simplicity, the expression (3.2.7') would be written as:

$$q' = q_T' + q_{BS}' \qquad (3.2.9)$$

where,

$$q_T' = (e'+p^*_T{}'-p_T') \qquad (3.2.10)$$

$$q_{BS}' = [(1-\alpha)(p_T'-p_{NT}')-(1-\alpha^*)[(p^*_T{}'-p^*_{NT}')] \qquad (3.2.11)$$

According to Égert (2003), if it is assumed that capital mobility is perfect across both sectors (T and NT) and interest rates are

exogenous, the sectoral relative productivity differentials are reflected in sectoral relative price differentials, according to the expression:

$$p_{NT}'-p_T' = ßa_T' + a_{NT}' \qquad (3.2.12)$$

where,

ß, represents the share of labour productivity of tradable versus non-tradable sectors;

$a_T', _{NT}'$, represent respective labour productivities according to tradable and non-tradable sectors. Thus, the expression (3.2.11), which is in focus of this material, may be rewritten in the function of the sectoral relative productivity differential.

$$q_{BS}' = [(1-\alpha)(a_{NT}'-ßa_T')-(a^*_{NT}'-ßa^*_T')] \qquad (3.2.13)$$

Based on equation (3.2.13), the BS effect may be analysed by using the fluctuations and domestic changes of the REER (3.2.11) or the sectoral productivity differentials (3.2.13). This is also the indirect way of estimating the BS effect. As long as the data on sectoral productivity are negotiable, one may use the equation (3.2.11), which measures the impact of sectoral productivity differential or the BS effect on the REER change. A positive correlation between relative productivity differentials and the REER explains the presence of the BS effect, if the assumption on the PPP presence holds for the tradable goods sector. This means that $q_T' \cong 0$ and that fluctuations in the REER are determined only by the sectoral productivity differential. If the hypotheses on the PPP was verified, then from expression (3.2.9), $q_T' \cong q_{BS}'$ is obtained. In other words, one would accept that if there existed a purchasing power parity for traded goods sector across countries, the REER change would be determined only by the sectoral relative productivity differential across countries. Acceptance of the assumption that $q_T' \cong 0$, and consequently, $q_T' \cong q_{BS}'$, is regarded as an ideal case for estimating the BS effect for a country.

4. DATABASE

Conclusions drawn from empirical evidences depend greatly on the quality of data. The latter would imply: (i) the proper number of basic indicators needed for making the estimations; (ii) accepted reliability level for these indicators; (iii) sufficient duration of relevant series that would enable the application of various methods of econometric estimation. Sections 2 and 3, in parallel with the theoretical framework of the BS effect demands a considerable number of indicators and various proxies, which would enable the capturing of the BS effect.

In principle, the minimum data base should contain indicators as: production or added value, number of employees, or in the best case the total productivity of the factors of production; the Consumer Price Index and Producer Price Index; the nominal and real exchange rates. Productivity and price indicators should be available for the country under research and for the foreign country (countries). To capture and measure the relative productivity effect on relative prices, the division according to tradable and non-tradable sectors is required for the respective indicators. Profound studies in this area[6], reveal that the sectoral division constitutes a debatable and determinant issue for the estimating process.

This paper has made use of official data on production, employment and prices in the Albanian economy and in that of the euro area (15 countries). Euro area is regarded as a foreign economy, with which Albania carries out trade exchanges. The convergence process is directly related to the meeting of standards in the framework of Stability and Association Agreement with the European Union. Candidate countries and moreover, those aspiring EU membership (such as Albania), have as their benchmark, the economic indicators of the euro area. The catching-up process or gap narrowing between an aspiring country and the EU member states, is definitely associated with important structural changes in the economies of candidate countries in their run-up to European Union. Reference to the euro area broadens the comparative base, without focussing the analysis only on some specific countries[7]. The long run development perspectives of the country, relate to the EU

integration challenges. Studying the BS effect from this viewpoint is assessed as more promising, since it makes use of a more representative information, which is symmetric and with an explicit vision for the future

The BS effect is estimated on the basis of quarterly data on sectoral prices and productivity, the lek/euro exchange rate, and the real effective exchange rate (REER) for Albania and for the euro area. Estimations are made on time series that extend along Q1:1998 to Q4:2006 period.

4.1 SECTORAL AND RELATIVE PRODUCTIVITY

Currently there is no any official indicator published in Albania for the total productivity of the factors of production (TPFP). For the TPFP, the proxy of labour productivity is largely used in literature. Most studies have revealed that the use of such a proxy is done due to difficulties to impossibility for measuring the productivity from other factors of production (land and capital).

In Albania's case, labour productivity by sectors of the economy is estimated as a ratio of the added value for each sector to the respective number of the employees. Quarterly data on the added value are obtained from initial estimations of INSTAT (April 2007)[8] for the quarterly GDP, for Q1: 2001 to Q4: 2005 period. An average growth rate is applied to each sector for 2006, as much as the expected economic growth of the country for this year[9]. For the period of Q1:1998 to Q4: 2000, the annual added value data (INSTAT, 2004) are taken. They are divided proportionally according to average annual weight of sales for each sector by quarters[10].

The data on the employment by sectors are obtained from the results of the structural survey of economic enterprises on 1998-2004 period, reviewed after the disclosure of survey results on assessing the standard of living (LSMS, INSTAT, 2004). Lacking the data on the number of employees for 2005 and 2006, the average annual growth rate over (2000-2004) is applied on the

basis of the last official data of 2004. This assumption is supported by data on gradual reduction of unemployment rate year on year[11]. The number of the employed for every quarter of each year is held unchanged (equal to the average number of the employed in the respective country). The productivity by sectors is measured as:

Productivity(i)=Added value(i) /Number of the employees(i),, where i – shows the sector.

For the euro area (15 member states), the respective productivity estimation is made according to the above formulae, taking quarterly sectoral data on the added value and on the employees[12].

Building the productivity series, for both tradable and non-tradable sectors of the economic activity, constitutes a very important element. Field studies indicate that there is no any theoretical, fully-specified rule for the classification of an economic activity in one sector or another. Such a division depends on: availability (duration and frequency) of national accounts data; disaggregation degree by sectors and sub-sectors of the economy, based on international standards of national accounts statistics; on the specific economic features of the country, - such as sectoral profile development, the degree of the country's economy openness in terms of exports, exchange rate role in the economy, etc.

In Albania's case, the branch of agriculture, hunting and fishery is excluded from the sectoral division. First, the data on the above branch, particularly those related to the number of the employees, are not reliable. According to official statistics of labour market for some years in a row (after '93 and onward), this number has remained almost unchanged. This fact can not be justified, if one takes into consideration the massive migration of rural population towards urban areas and the emigration. The concern related to the unreliable figure on the employees would directly influence the agriculture productivity figure. Secondly, Mihajljek and Klau (2003), provide a strong economic reason for the non-inclusion of the relevant branch in the tradable sector of the economy. The trade of agricultural and animal products (prices) is deformed by the Common Agricultural Policy. Free trade agreements[13], have

imposed a price policy almost independent of relative productivity differential or competitiveness. Public administration, defence and social protection sectors are not included in the non-tradable sector, because of the difficulty in interpreting labour productivity indicator in these sectors.

The tradable and non-tradable sectors are divided on the basis of sector's weight in exports and/or the competitiveness size of different sectors of the economy in the international market. De Gregorio, Giovannini and Wolf (1994), define as tradable those sectors for which the export share to total production is larger than 10 percent. Mihaljek and Klau (2003) were also based on this criterion for the sectoral division of productivities. The selection of reference export share is a negotiable point and it is charged with subjective elements. In various studies, the reference share may be higher (20% in Slovenia's case) or even lower. In Albania's case, the average share of exports to sales volume over Q1:2001 – Q4:2006 period (see Table 1) is used for judging on such a criterion.

Table 1 Average share of exports to sales volume by sectors

Sectors	Export share to sales volume (%)
Industry	20.6
Construction	1.2
Trade, hotels and restaurants	3.8
Transport and telecommunication	13.8
Other services	4.5
ECONOMY[14]	8.9

The following branches are included in the tradable sector: Industry, transport and telecommunication, because of the relatively high share of exports to the sales volume[15]. Construction is also included in this sector, though from export profile viewpoint it should have been included in the non-tradable sector. This is so because, given the high price level, relatively comparable with foreign ones, it behaves as for a tradable sector. The non-tradable sector includes mainly services: "Trade, hotels and restaurants"; and "Other services". A better view may be given by the division of sectors into sub-branches, but the current disaggregation of all indicators simultaneously (according to the added value, sales and

employment) is not available. However, in order to have a more explicit idea on the impact of sectoral divisions for estimating the BS effect, likewise Égert (2004), this research has also provided some variants or other combinations of sectoral division, along with the above-mentioned one, which is regarded as the core division. The basic variant of classification is similar to the one applied by Mihajljek and Klau (2003), Randveer and Tober (2002), Coricelli and Jazbec (2001), De Broeck and Slok (2001) in their researches for estimating the BS effect (Gutsalyuk, 2004)[16].

Concluding about this point, regardless of the problems faced about sectors' classification, particularly about those of in-between nature, there is evidenced a tendency of researchers to simplify the considerations on sectoral division.

On the basis of tradable and non-tradable sectoral divisions, two productivity estimations of the tradable sector and three productivity estimations of the non-tradable sector were calculated. Tables 2 and 3 provide the estimations of productivity for each sector (depending on the economy sectors' involvement) and the relative productivity, respectively.

Table 2 Sectors' division and relative productivity

Estimation	Relative productivity code	T sector	NT sector
1	LP_1= T_ Prod/NT_Prod_1	T_ Prod: Industry, Construction, Transport and Telecommunication	NT_ Prod_1: Trade, Hotels, Restaurants and Others
2	LP_2= T_Prod/NT_Prod_2	T_Prod: Industry, Construction, Transport and Telecommunication	NT_Prod_2: Trade, Hotels and Restaurants
3	LP_3=T_Prod_1/ NT_Prod_3	T_Prod_1: Industry, Construction	NT_Prod_3: Transport and Telecommunication, Trade, Hotels and Restaurants and Others

Table 3 Division of sectors and relative productivities between Albania and the euro area

Code for relative productivities across countries	Code for relative productivities in the euro area	Tradable sector for the euro area	NT sector for the euro area

LP1_ex= LP_1/LP_EU LP2_ex= LP_2/LP_EU LP3_ex== LP_3/LP_EU	LP_EU= T_Prod_EU/ NT_Prod_EU	T_Prod_EU: Industry, Construction,	NT_Prod_EU: All others
LP4_ex= LP_1/LP_EU_1 LP5_ex= LP_2/LP_EU_1 LP6_ex= LP_3/LP_EU_1	LP_EU_1= T_Prod_EU_1/ NT_Prod_EU_1	T_Prod_EU_1: Industry	NT_Prod_EU_1: All others

4.2 SECTORAL AND RELATIVE PRICES

The most commonly used proxies in literature are the GDP deflator and Producer Price Index for tradable goods sector and the Consumer Price Index for non-tradable goods sector. A more accurate way is the CPI disaggregation into tradable prices and non-tradable prices, which was used by Mihaljek and Klau (2003) and Égert (2003). This study has followed the method suggested by the above-mentioned authors, because using CPI as a proxy for tradable prices did not turn out to be suitable. In Albania's case, the sectoral division of the CPI basket is reviewed[17], comparing it to the one treated in the preceding studies[18]. This review is made on the basis of information from INSTAT relative to the imported share of 54 sub-groups of the 2004 CPI basket. According to this information and the field experts' judgement on potential changes over 2005-2006, it is assessed that the sub-groups of the imported weight 50% are expected to be included in tradable prices and the part that does not satisfy this condition is expected to be included in non-tradable prices of goods and services. From the average weighted CPI aggregation, normalised at the value 1, of respective sub-groups, we come to CPI according to tradable and non-tradable sectors. Based on this concept, the weight of tradable and non-tradable goods in the CPI basket resulted to 54 and 46 percent, respectively. This division is assessed to be more accurate from the economic viewpoint than from the previous ones. It makes use of information on imported weight of the CPI basket of goods, while other measures, lacking this information, divide this basket more on the basis of physical feature of transport of goods and services.

The CPIs series of the tradable and non-tradable sectors for the euro area are the ones estimated and used by Mihaljek and Klau

(2003). According to them, the HCPI basket division for tradable and non-tradable prices is around 59.5 and 40.5 percent, respectively (see Appendix 9.1). On the basis of above estimations, below are presented alternatives of relative price calculations.

*Table 4 Relative prices**

Estimation	Relative price code	T goods prices	NT prices
1	$PR_1 = CPI_{\_PT} / CPI_{\_T}$	$CPI_{\_T}$	$CPI_{\_NT}$
3	$PR_3 = CPI_{\_NT} / CPI_{\_T\_1}$	$CPI_{\_T\_1}$ Tobacco and oil prices excluded	$CPI_{\_NT}$
4	$PR_4 = CPI_{\_NT\_1} / CPI_{\_T\_1}$	$CPI_{\_T\_1}$	$CPI_{\_NT\_1}$

Note: (*) In the case of international BS effect, the relative prices are marked with RP_ex and are measured with the ratio of the CPI of the country to CPI of the euro area.

5. FACTS AND BASIC THEORETICAL HYPOTHESES OF THE BS PHENOMENON: ALBANIA'S CASE

5.1 FACTS FROM THE ALBANIAN ECONOMY

The graphical presentation of the sectoral data of relative prices and productivity helps create the initial idea on the presence of the BS phenomenon in Albania for the period under study.

Labour productivity (T_Prod and T_1_Prod) has increased faster in tradable than in non-tradable sector of the economy. In accordance with the theory, the productivity growth in tradable sector leads to increased non-tradable prices, which is easily noticed in chart 2 – where the non-tradable prices are higher than those of the tradable sector. The differential between them is smaller in the case when oil and tobacco prices are excluded from calculation of the tradable price index (CPI_T_1) and in the case when energy, water and rent prices are excluded from the calculation of non-tradable price index (CPI_NT_1).

Chart 1 Labour productivity in Albania*

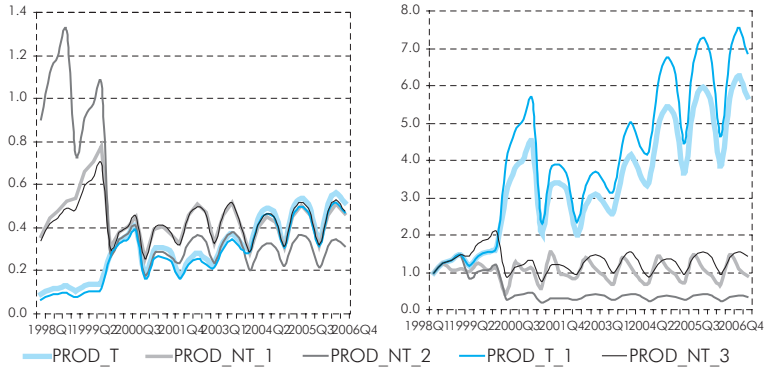
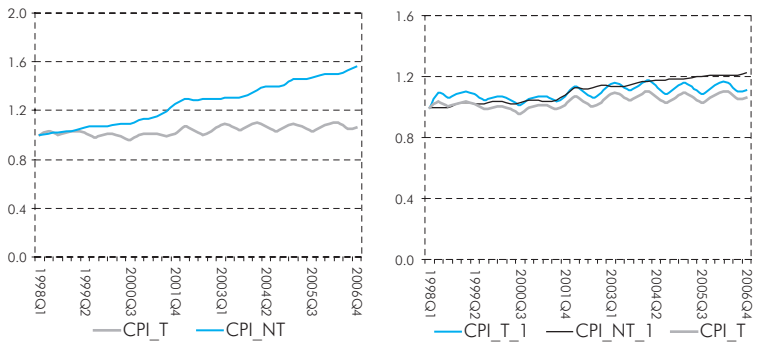


Chart 2 Tradable and NT prices**



Note: (*) Chart 1 shows labour productivity in absolute value (on the left), with the first quarter of 1998 (on the right) as the basis; (**) Chart 2 shows T and NT prices based on the CPI disaggregation (on the left), with the first quarter of 1998 (on the right) as the basis.

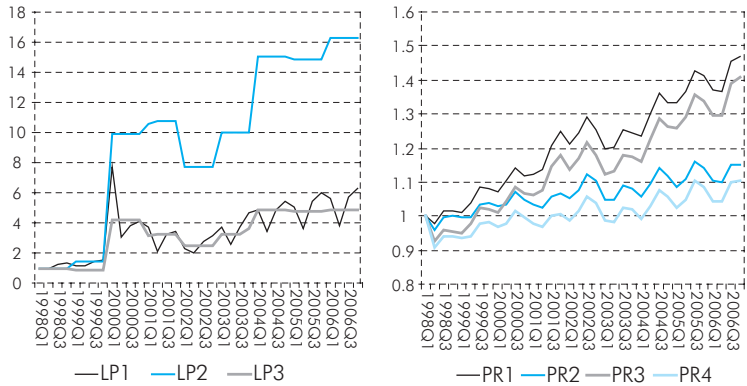
5.2 BASIC THEORETICAL HYPOTHESIS

5.2.1 Sectoral productivity behaviour

The core of productivity hypothesis stands in the parallel growth of relative non-tradable prices with the relative productivity growth of the tradable sector. This relationship (in all possible combinations) is reflected in the following chart. It result that:

(i) In all sectoral combinations, tradable sector productivity is higher, in levels and in annual growth rates, than labour productivity in the non-tradable sector.

Chart 3 Productivity and relative prices (with the base Q1:1998)



(ii) Either graphically or from the calculations, the annual growth rates of relative productivity of the tradable sector are reflected partially in the annual growth of relative prices of the non-tradable sector. Relative productivity growth rates are on average higher than those of the relative prices. Annual average rates[19] of productivity growth are about 25 percent, whereas those of relative prices are only 3 percent.

5.2.2 Perfect labour mobility across sectors

Market liberalization reforms after '90s have also affected the labour market. The mobility from one sector to another is driven by factors that have to do first of all with the privatisation reform. At the beginning of this process, labour mobility from one sector of the economy to another was more or less chaotic and was dictated by the need for finding a suitable job, where wage might have been one of the variables influencing in the decision-making of the job seeker, but not the most important one. The fact that about 62 percent [20] of those employed in the private sector lack regular job contracts with the employer, indicates that labour mobility is not conditioned by contractual (legal) elements; moreover, it may be regarded as "released" from such a condition. The employees

may pass from one sector to another, without being subject to obligations. Also, employers are not subject to higher wage pressure from employees, because even in this case no contractual obligations exist. This argument is highlighted even more under the conditions when the role of trade unions protecting the rights of the employees is still vague in Albania (Nasto, Çeliku 2005). About ½ of the employees state that they do not have negotiating force in the process of wage setting and review[21]. Given the above, it seems that in the employee-employer relations, the determinant role is played by the latter one. The economic factors, such as low wage level in Albania versus that of the EU member states, and the presence of economic emigration of Albanians, support the idea that the motive for achieving a higher wage and better living conditions, is to a certain degree sufficient to induce labour force to move from the domestic market to the international one. The degree of openness is almost one-sided, i.e., no barriers exist in the domestic aspect, whereas in the foreign aspect they are still strong. The assumption of perfect labour mobility from one sector to another is based on the domestic plan, rather than on the foreign one.

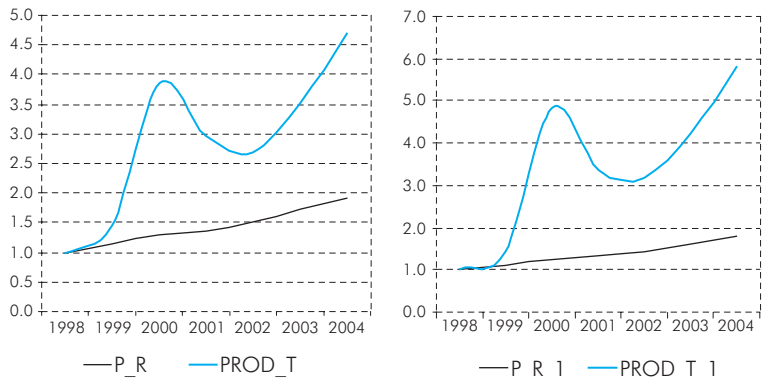
5.2.3 Equalization trend of sectoral wages

Sectoral wage equalization trend or the convergence towards higher wages in the tradable sector is a relatively difficult assumption to be verified, particularly by empirical arguments. In Albania's case the issue is complicated by the presence of restricted, less reliable data on labour market and wages (IMF, May 2006), due to high level of informality in this market. The data on wages by economy sectors are annual and extend over the period of 1997 – 2004. The use of various sources of information and the change of estimation approaches mostly generate discrepancy and structural breaking of the series.

At this point, the goal is (i) to analyse whether there is any relationship between real wages and tradable sector's productivity and (ii) to verify the equalising trend of nominal wages between both sectors. In an effort to verify this assumption, the approach

suggested by Égert (2003) is applied. According to this approach, the real wage (R_W) is obtained by indexing the nominal wage of the tradable sector of the economy with the index of the tradable prices measured by the CPI (T_ CPI), whereas the estimation used for approximating the productivities in this sector is used as an index of the real productivity of the sector. Estimations are made for both classification approaches of the tradable sector of the economy (T_Prod and T_1_Prod) and only for the first approach of estimating the tradable price index .

Chart 4 Productivity and real wage in the tradable sector

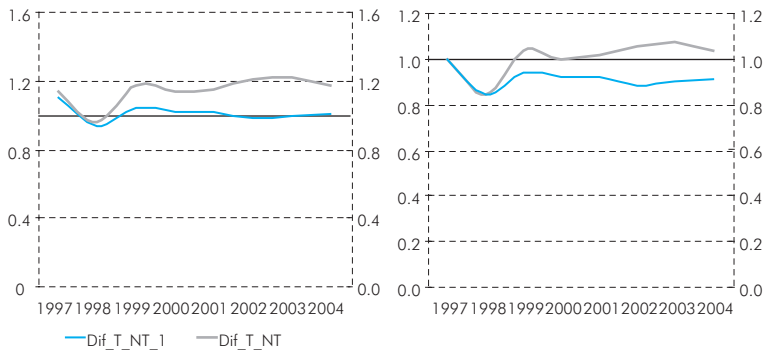


In general, concerning the tradable sector, it results that productivity and the real wage have the same trend. This supports, at least with available data, the presence of the relationship between real wage and productivity development in the tradable sector.

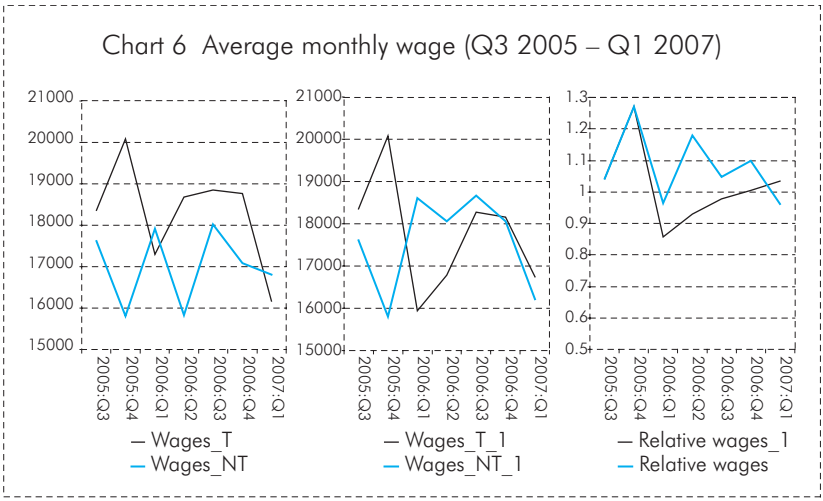
(ii) The other step is the investigation of nominal wage trend across both sectors. It comes out that this process operates in terms of wage equalization trend for both sectors. The wages tend to get more and more equalised. As indicated even theoretically, the nominal wage of the tradable sector of the economy is higher than that of the non-tradable sector; a fact that results not only in the basic division of sectors, but also in other sectoral divisions[22]. The

almost absolute convergence across both sectors' wages, though (the equalization) constituting an extreme case in the sectoral system of wages for an economy, leads to the second division of tradable versus non-tradable sectors[23]. If we turn back to relative data, it results that the wage ratio is relatively steady over time and is independent of the approaches of tradable and non-tradable sectors' division in the economy.

Chart 5 Wages equalising trend in absolute and relative terms



From 2005 and on, in absence of official data on sectoral wages, an equalising trend of both sectors' wages is observed, according to the survey carried out by Bank of Albania's branches on businesses in various districts[24]. The sectoral differences among average wages vary from 5 thousand to 25 thousand leks. Though currently the series is very short to conclude, an equalising trend is observed between average wages of the tradable sector and those of the non-tradable sector for the coming period. This trend becomes more apparent (the variant Wages _T_1 and Wages_ NT_1) when transport is included in the non-tradable sector. The relative wage indicator, denominated in non-tradable sector's wages, tends to 1 in both cases.



Beyond the descriptive analysis of wage market trends, the results from the Granger-Causality test indicate that the level of wages and their rise in the tradable sector leads to the wage developments in the non-tradable sector, with some lags (see Appendix 9.2). The signals from the wage developments in the tradable pass to the non-tradable sector, with not less than a six-month lag. With lags of more than four months, the causality direction is always statistically significant, from T → NT. The annual growth perception is transmitted in the same direction, but with a lag of not less than two years.

Facts and analysis of the base hypotheses of the BS effect verify partially the presence of the BS in Albania. However, the incomplete database and problems with the degree of the reliability, lead to the need for cautious considerations of the conclusions.

6. BALASSA – SAMUELSON EFFECT IN THE ALBANIAN ECONOMY

6.1 BS DOMESTIC EFFECT

This section deals with the relationship between relative productivity (T/NT) and relative prices (NT/T), within the Albanian economy,

through the simplest form of Balassa - Samueson. The relation (3.1.13/a) may be further developed in terms of price indices and sectoral productivity according to the following equation:

$$log\left(\frac{Price\_Index^{NT}}{Price\_Index^{T}}\right)=\beta_0+\beta_1 log\left(\frac{Price\_Index_{t-1}^{NT}}{Price\_Index_{t-1}^{T}}\right)+\beta_2\left[log(LP^{T}-log LP^{NT})\right]+\varepsilon_t \quad (6.1.1)$$

This equation shows the relation between relative prices of nontradables in terms of tradables of the consumption basket (on the left) and relative productivity of tradables in terms of nontradables of the economy (on the right). In this phase, the estimation of such a relation aims to measure: (i) the extent to which relative productivity determines relative consumer prices in the economy, that is, how strong the inflation-productivity relationship is; (ii) the extent the inflationary pressures are added in the economy, due to increased differential across sectoral productivities. The answers related to the above elaborate further the judgement on their implications in the monetary policy followed by the central bank. A perfect case of the presence of the BS effect would be when relative productivity growth is fully translated into relative price rise.

Estimations on the basis of the equation (6.1.1) will be made for four combinations of relative price series (RP1 - RP4) and for three combinations of relative productivity series (LP1 - LP3). The series are tested in advance for the stationarity by means of the ADF criterion. When they result as stationary at the level, the above equation is calculated by means of the OLS method. Otherwise, the estimation of the domestic BS effect is made by means of the VECM[25] method.

From the stationarity test[26] results that all series except for PR3 and LP1 are found stationary in the level (Appendix 9.3). For the stationary series[27], the OLS method is used to estimate the equation (6.1.1) and the results from the regression coefficients are interpreted directly as elasticity. The results obtained from the regression are reported in the Appendix 9.5.1. The positive relation between relative productivity and relative prices is verified in each of the combinations ($\beta_2>0$), supporting the presence of the BS effect. This effect is estimated as weak, which is supported by low values

of the regression coefficient $ß_2$. The highest coefficient $ß_2$=0.03 resulted from the relation between RP4 and LP3, with R^2_{adj} = 0.65.

For both proxies of relative productivity LP2 and LP3, the $ß_2$ coefficient varies in a relatively narrow band of 0.02-0.03. This means that transport and telecommunication sector that was once classified as tradable and once as non-tradable, or the sectors that were not included in the estimation (such as 'Others') do not have any determinant impact on the final result.

Interpreting the results, if the relative productivities LP2 and LP3 increase on average by 10 percent, the relative prices measured by RP1, RP2 and RP4 will increase on average by about 0.2 and 0.25 percent, with a lag of one quarter.

So, we may conclude that the impact of sectoral productivity differentials on relative prices is relatively weak in Albania. The $ß_2$ coefficient is regarded as low even if compared to the results of estimations for different countries (see Table 4).

Table 4 Comparative table [28] of the size of the BS effect

Country	Coefficient ß
Croatia	0.57
Czech Republic	0.07
Hungary	0.9
Poland	1.2
Slovakia	0.4
Slovenia	0.2
Albania	0.03

It is important to estimate the extent by which the overall price level of the country would be influenced by productivity differential. This would allow us to estimate additional pressures that productivity may cause on inflation. To measure the impact of productivity differential on the overall price level, the Mihaljek and Klau (2003) approach is applied. According to it, a combination of coefficients value, of the average productivity growth in the country and of the non-tradables weight to the consumption basket would bring about the average price level differential (in pp), where relative

productivity has increased by 1 pp for the period under study (6 years) (see the last column of table 5)[29].

Table 5 Estimation of domestic BS effect

	Equation 6.1.1		
Measuring the productivity	Productivity growth differentials	Contribution of productivity differentials to relative price rise	Domestic BS effect
	Coefficients Mean $ß_2$		
LP2	0.019	0.02	0.01
LP3	0.023	0.01	0.01
		On average	0.01

The conclusions drawn in this section refer to the case when the economy of the country is considered as isolated, abstracting from the economic relations, mainly the trading relations with other countries. This constitutes a "naïve" treatment of the BS effect, since the economies are getting more and more opened and the globalization process is advancing rapidly. From this viewpoint, it constitutes only the first step of studying the BS effect in the case of Albania's economy.

6.2 INTERNATIONAL BS EFFECT: THE APPROACH STUDYING CROSS-COUNTRY RELATIVE PRODUCTIVITY AND RELATIVE PRICE CORRELATION

To overcome the problem of studying under the conditions of an isolated economy, the broader model of the BS is employed for the country's inflation. The study of relative productivity and relative price relationship between Albania and the Euro area places the analysis of the BS effect on a more realistic ground. Productivity differential effects on both economies under discussion are translated into relative price differentials. The latter may be amplified through real exchange rate developments. Likewise in the research of Mihaljek and Klau (2003), the effects can be found through the equation (6.2.1). The results from the regression coefficients will help estimating quantitatively the BS effect and the real exchange rate impact. Equation 3.2.1 takes the following form:

$$log\left(\frac{CPI}{HCPI\_EU}\right)=c+\beta_0 log\left(\frac{CPI}{HCPI\_EU}\right)_{(t-i)}+\beta_1\left(log(ER_t/ER_{t-1})\right)+\beta_2\left[(1-\alpha)(log(LP^{AL})-(1-\alpha^*)log(LP^{EA})\right] \quad (6.2.1/a)$$

$$Dlog\left(\frac{CPI}{HCPI\_EU}\right)=c+\beta_0 Dlog\left(\frac{CPI}{HCPI\_EU}\right)_{(t-i)}+\beta_1\left(D(log(ER_t/ER_{t-1}))\right)+\beta_2\left[(1-\alpha)(dlog(LP^{AL})-(1-\alpha^*)dlog(LP^{EA})\right] \quad (6.2.1/b)$$

where, HCPI_EU is the Harmonised Consumer Price Index for the euro area, ER is the nominal Lek/Euro exchange rate; LP^{Al} is the relative productivity index for the country and the $LP^{EA}$is the relative productivity index for the Euro area.

The econometric procedure followed for estimating the international BS effect is the same with that of the domestic BS effect. Appendix 9.5 presents complete results of stationary and regressive tests according to various approaches. The OLS method is applied for stationary series, whereas non-stationary series are included in a VEC model.

Table 6 Estimation of the international BS effect

	Equation 6.2.1/A		Equation 6.2.1/B		International BS effect
Measuring the productivity	$log(ER_t/ER_{t-1})$	Productivity growth differential	$(D(log(ER_t/ER_{t-1}))$	Change of productivity growth differentials	
	β_1	β_2	β_1	β_2	
LP2_ex	0.38	0.010	0.18	0.012	0.01
LP3_ex	0.39	0.013	0.20	0.014	0.01
LP5_ex	0.38	0.011	0.17	0.011	0.01
				On average	0.01

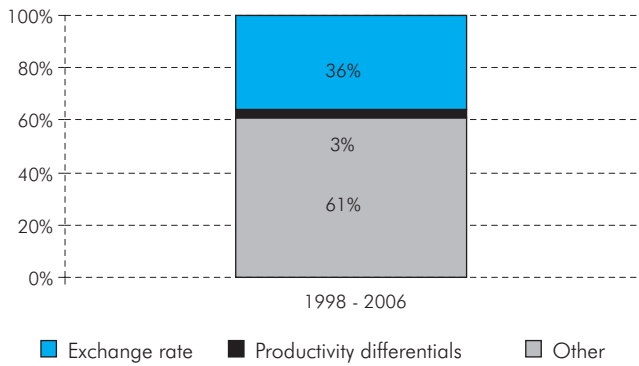
The impact of relative productivity differential between both economies on relative prices is low for the period under study. It comes out of the third column of table 6 that the productivity differential growth by 1 percentage point would be associated with increased inflation differential by 0.01[30] pp. The average growth[31] of relative inflation (of the country against that of the euro area) would be the same, if the productivity differential in Albania grew by 1 percentage point faster than in the euro area.

Comparing the conclusions of the domestic versus the international BS effect, it results that in both cases the BS effect is

moderate. It influences the country's inflation by around 0.01 pp in both cases. Due to restrictions in perfect labour mobility from the domestic economy to that of the euro area, and low competition in exports and technology of the Albanian economy, no difference is evidenced between the domestic and the international BS effect. It results that the inflation differential across countries is significantly influenced by the lek/euro exchange rate. The regression coefficient (second column, table 6), denotes the exchange rate impact on relative prices (of Albania versus those of the Euro area). The values of this coefficient are some times higher than those of the coefficients. Their average is about 0.4.

For the period under study, it has resulted that in the inflation differential versus that of the euro area (0.3 percent), the exchange rate has contributed about 61 percent, cross-country productivity differential has contributed only 3 percent (external BS effect) and the rest is explained by other factors of monetary and non-monetary nature.

Chart 7 Inflation differential determinants
(contributions in percentage)



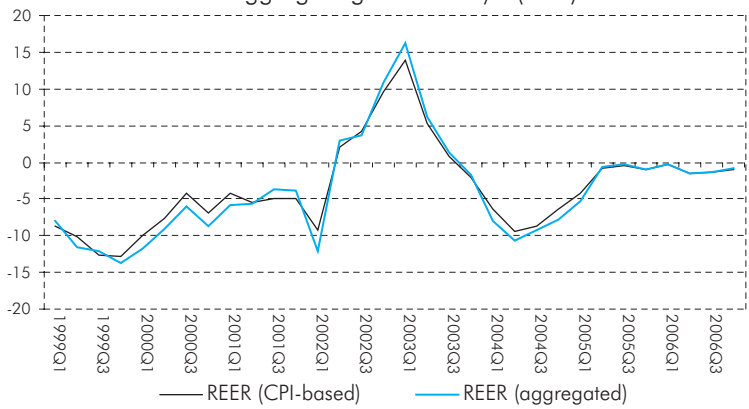
6.3 ANOTHER APPROACH FOR ESTIMATING THE BS EFFECT AND ITS LONG RUN EFFECT ON REAL EXCHANGE RATE TREND

Another approach for estimating the BS effect is the one provided after dissagregating the REER according to the basic

formulae (3.3.6). This approach prevents the need for availability of productivity series by sectors, which constitutes a debatable issue, particularly when the disaggregation level of data is low (Albania's case). The assessments may be sensitive to sectoral divisions (Egert, 2003). Based on the REER[32] series - based on its estimations according to CPI, (Vika, 2006) - and tradable and non-tradable price indices for Albania and for the euro area, which are less contestable from their construction viewpoint, the constituent parts of the (3.2.6) formulae may be calculated. Then the impact of each component on the REER growth rate will be analysed, in order to conclude whether a BS effect is present or not and whether its relation to the REER constitutes or not a factor that is expected to influence in the long run.

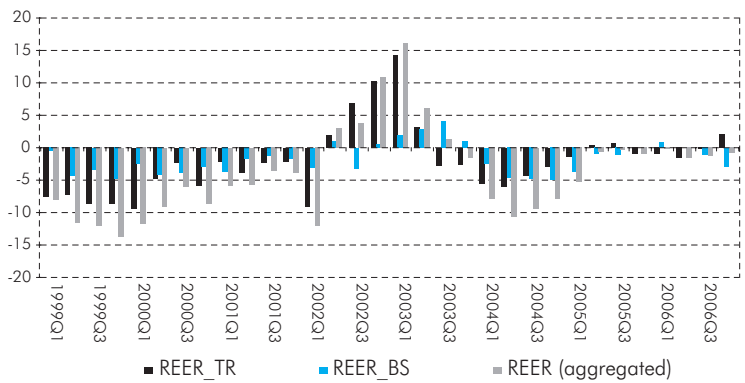
In calculating the REER, the European currency accounts for about 80 percent of the basket of foreign currencies. The most important trading partners of Albania are Italy, Greece, Germany, Turkey, and even China in three latest years. A better approach to the real value of the REER is achieved when using information on sectoral consumer price indices for Albania and for the euro area. Whereas, the PPI and CPI based approach for representing respectively the tradable and non-tradable sectors for Albania and the euro area, results with high deviations compared to CPI-based REER estimations (Vika, 2006).

Chart 8 Annual growth rates of REER (CPI-based and aggregating the effects)[33] (in %)



Excluding 2002-2003 period, the annual REER performance indicates a continuous appreciation of the national currency vis – a - vis the foreign currencies basket[34]. The results show slight deviations, because the estimations according to relations (3.2.10 – 3.2.11), have taken into consideration only the price indices for the Euro area and not those of other countries, already included in the calculation of the REER[35]. However, the trend of both estimations is the same and their annual rates in average terms are very close to each-other.

Chart 9 Annual growth rates of REER and its components (in %)



The estimations indicate that for the period under study, there exists a very strong positive relation between the REER and its component q_T' which is determined by the relative price differential between the tradables of the euro area and those of the country. This relation is estimated by the correlation 0.9 and is simultaneous. The component of the sectoral productivity differential between Albania and the euro area (q_{BS}'), presents a lower correlation, about 0.7, with the actual value of the REER. This relation is further strengthened for relevant annual rates, when a one-month lag is applied for the REER_BS annual rate. The results indicate that for the period under study, the BS effect has contributed to national currency appreciation, on average by 1.4 pp, while the other component, which provides the relative price differential between

the tradable goods of the euro area and those of Albania, results with a higher effect, about 2 pp, indicating that the latter is more determinant on the REER performance. Moreover, the high positive degree of correlation and the weight of q_T' to annual changes of the REER, indicate that the assumption on the presence of the PPP theoretical condition for the tradable sector, expressed in the relation $q_T' \cong 0$, can not be fully verified for the Albanian economy.

It seems that the REER movements, particularly toward appreciation, are attributed mostly to relative price differentials between the tradable sector of the euro area and those of the country. In other words, even the relative productivity differentials in the REER are transmitted mostly to the tradable sector, indicating that the assumption for the PPP can not be verified for our economy. Referring to above results, we conclude that Albanian economy is more in line with the conditions presented in column 2 (Tab. 8).

*Table 8 PPP hypothesis and Albanian economy**

If the PPP hypothesis for the T is verified: (1)	PPP hypothesis results for Albania: (2)
$q_T' \cong 0$	$q_T' < 0$
$q_{BS}' < 0$	$q_{BS}' < 0$
$q' < 0$	$q' < 0$

Note: * The negative values of the annual growth rates imply national currency appreciation.

A non-verified PPP for the Albanian economy means that the tradable goods of the country can not fully substitute the foreign ones from the viewpoint of the purchasing power of the currency. The low competitiveness of Albanian goods in the international market, reflected in a low performance of exports and the presence of obvious differences in technology, where low technology in our economy does not encourage high labour productivity growth, support the non-fulfilment of the PPP in our case. Though positive efforts have been made in this aspect, it seems that the domestic economy is not yet capable of catching-up European standards, particularly through the productivity growth channel, which implies also a perfect labour mobility from one sector to another from Albania to the euro area countries.

However, the results of this approach indicate that sectoral productivity differentials (T/NT) between Albania and the euro area have encouraged the appreciation of national currency during period, maintaining its satisfactory equilibrium, particularly after 2003. Further analysis is intended to explore whether the BS effect is likely to play a more complete role in the long run REER equilibrium. To this end, the series of the REER and REER_BS are tested for stationarity (the ADF test results are revealed in the Appendix 9.6.1.). They result non-stationary (at levels) and shift to stationary, being transformed to first differences. Absence of stationarity at levels opens the possibility of testing for the presence or not of a co-integrated vector (Johansen test results, Appendix 9.6.2.). The results indicate that a cointegrating relationship exists and moreover a long-term equilibrium may be verified between the REER and the BS effect, thanks to relative productivity differential. The result on the adjustment coefficient (-0.12) indicates that the shocks to the REER only because of the relative productivity differentials, may be equilibrated after about 8 quarters or after 2 years. This result is comparable with the cases of Estonia and Lithuania (Loko and Tuladhar, 2005). The above results in terms of the relationships between productivity differential (presence of the BS effect) and the real exchange rate constitute only the bases on which a more elaborated model may be set up for studying the long run equilibrium of exchange rate in Albania.

7. CONCLUDING REMARKS

In order to fulfil the purpose of this study for verifying the presence of the BS effect in the Albanian economy over 1998 – 2006 and for estimating it, the following essential aspects were explored: (i) the presence and estimation of the strength of correlation between relative productivity and relative prices; (ii) the additional pressure on the overall price level as a result of relative productivity growth. Both these aspects were studied in the framework of the BB and BS effect and the nominal exchange rate effect; (iii) the relation between cross-country relative productivity and real exchange rate developments (REER) in Albania's case, shedding light on the construction of the exchange rate equilibrium model.

The most important findings, based on econometric analyses are:

- The fact that productivity differentials of the tradable relative to non-tradable goods sectors are positively correlated with non-tradable price development relative to tradable ones. In other words, the domestic (BB) effect and the international BS effect are verified. However, the strength of relationship between the relative productivity and relative prices in the domestic economy and between it and the Euro area's economy does not, in any case, result high;

- From the quantitative viewpoint, comparing the conclusions of the domestic BS effect versus the international one, it results that in both cases the BS effect is moderate, only 0.01 pp. Due to restrictions in perfect labour mobility from the domestic economy to that of the Euro area, and the low competitiveness in exports and technology of the Albanian economy, no change has been evidenced between the domestic BS effect and the international one;

- To judge on the presence of the BS effect and to estimate it, a complete database was constructed to enable the economic analysis of factors and the base hypothesis of the BS effect in Albania. Quantitative estimations in terms of the BS effect were carried out, based on various alternatives of setting up proxies for measuring relative productivity and relative prices, as also recommended by respective literature. The work on the database has highlighted that lack of data of a higher frequency than annual and the lack of various indicators – particularly basic data on the real economy sector, such as production by branches, labour and wage market – currently does not create room for more profound studies. Furthermore, it may bring about problems in interpreting the achieved results;

- Because of the above reason, efforts have been made to estimate the BS effect according to various alternatives of composition of tradable and non-tradable sectors of the economy. So, the transport and telecommunication sector

was once included in the tradable sector and once in the non-tradable sector. The BS model was tested for three relative productivity estimations. In every case, the correlation between relative productivity and relative prices was positive, testifying steady results.

- Price convergence was based on the disaggregation of the Consumer Price Index for Albania and for the euro area. Some alternative series were constructed for tradable and non-tradable prices. The CPI_T_1 alternative excluded tobacco and oil prices from calculation, because they are greatly influenced by changes in taxes in international oil prices. The CPI_NT_1 alternative excluded energy and water prices (as administered prices) and rent price[36] from calculation of the non-tradable price index, which is not directly related to the BS effect;

- The assumptions on perfect labour mobility and the relation between productivity differential and real wage of the tradable sector find empirical evidence. Labour is perfectly mobile between both sectors of the country, and thus nominal wages between sectors tend to get equalised. Also, the real wage trend in the tradable sector is in line with the productivity in this sector;

- From the simple correlations studying the domestic and international BS effect, it resulted that the latter has operated in an incomplete way; however, the exploration of the relationship between relative productivity differential and REER denoted that the magnitude of impact is relatively high. Annual REER appreciation is estimated at 40 %, attributed to sectoral relative productivity differential between Albania and the Euro area, and the rest is transmitted through the tradable goods price. The latter is evidenced as a strong channel that has further amplified the appreciating trend of the national currency versus the basket of foreign currencies, for the period under study. In this sense, the phenomenon of the presence of purchasing power parity for Albania can not be verified. This is due to low competitiveness of Albanian goods in the international market, reflected in a low performance of exports

and in the presence of low technology, thus not providing the proper stimulus for high labour productivity growth.

- The drawn conclusions are estimated in the framework of implications for the monetary policy of the Bank of Albania. Estimating the size of the BS effect makes us conclude that this effect is not as strong as to determine inflation in the short and medium run. Hence, productivity growth – a supply side factor - does not cause a high and ongoing increase of price level in Albania;

- From a long-term viewpoint, the implications are more obvious on the real exchange rate. Though the results indicate that there are few appreciating pressures on the real exchange rate on the supply side, shocks only from productivity differentials may disequilibrate the real effective exchange rate, which may return to equilibrium only with a 2-years lag;

- A specific research on exchange rate equilibrium has to be made. It is important to consider the presence of the BS effect on setting-up a specific model on long-term exchange rate equilibrium, in spite of its moderate values in the short run.

However, over the next few years, the contribution of the BS effect to inflation and exchange rate developments in the Albanian economy may become more significant. While the transition to a market economy was characterized by productivity growth in both the traded and the non traded goods sectors, convergence to EU levels of economic competitiveness will require strong gains in the relative productivity of the traded good sector. This expected to take place following the convergence process of the country to EU standards in the framework of implementing the Stabilization and Association Agreement. The enrichment of the database might bring new insights in the estimation of the BS effect. Therefore it is necessary the revision of this effect in the Albanian economy in the future.

LITERATURE

Balassa B, 1964, "The Purchasing Power Parity Doctrine: a Reappraisal", Journal of political economy,72

Burgess, R, Fabrizio, S. & Xiao, Y. 2003, *"Competitiveness in the Baltics in the Run-Up to EU Accession,"* IMF Country Report No. 03/114

Çeliku, E., Nasto, R., 2005, "Bank of Albania signals, expected versus actual inflation for 2004", Economic Bulletin, Volume 8, No. 1, March 2005

Égert, B (2001) *Does the Balassa-Samuelson Effect Matter for Central Europe's Transition Economies During the Run-Up to EMU?*

Égert, B (2002) *Nominal and Real Convergence in Estonia: The Balassa-Samuelson (Dis)connection Tradable Goods, Regulated Prices and Other Culprits*

Égert B, Drine I, Lommatzsch K, Rault Ch, (2003) *The Balassa-Samuelson Effect in Central and Eastern Europe: Myth or Reality?*

Égert, B, 2003, *"Assessing Equilibrium Exchange Rates in CEE Acceding Countries: Can We Have DEER With BEER Without FEER? A Critical Survey of the Literature"*, *Focus on Transition*, ONB, No. 2.

Égert, B., 2004, *"Equilibrium Exchange Rates in Southeastern Europe, Russia, Ukraine and Turkey: Healthy or (Dutch) Diseased?"*, ONB, No, 2

Gutsalyuk, O., 2004, *"The Relationship between productivity and prices: the case of Ukraine", NU "*KMA".

Olters J-P, 2005, *"Is inflation too low in Albania? Macroeconomic*

foundations and socioeconomic development", Conference V, BoA

IMF, May 15, 2006 "*Statement by IMF Staff at the Conclusion of the Article IV Consultation and the PRGF-EFF Review Mission to Albania"*, www.imf.org.

Kuznima I, Lobakovs, 2004, "*The impact of labor productivity differentials on inflation and real exchange rate: An estimation of Balassa-Samuelson effect in Latvia"*

Loko, B., Tuladhar., A, 2005, *"Labour Productivity and RER: the Balassa-Samuelson Disconnect in the FYRoM "*, IMF, WP/05/113

MacDonald, R.& Ricci, L. 2001*, "PPP and the Balassa Samuelson Effect: The Role of the Distribution Sector,"* IMF WP 01/38.

Mihaljek, D., Klau. M., 2003, *"The Balassa-Samuelson effect in CE: a disaggregated analysis"*, BIS, WP 143.

Samuelson P, 1964, "*Theoretical notes on trade problems*", Review of Economics and Statistics 46: pg 145 -54.

Vika I., (2006) "*Kursi real efektiv i këmbimit në Shqipëri konceptet dhe matja e tij*", Discussion Paper (in Albanian Language) Nr. 2(18), 2006, Bank of Albania.

9. APPENDIX

9.1 DIVISION OF CONSUMER BASKET INTO T AND NT PRICES

Euro area*:

T (goods and services)	Weight	Weight (in %)
Food	156	15.6
Beverages	39.2	3.92
Clothes	74.6	7.46
Equipment	77.6	7.76
Transport	151.5	15.15
Hotels and restaurants	96.2	9.62
Total of T sector	595.1	59.51
NT (goods and services)	Weight	Weight (in %)
Housing	149.2	14.92
Health	40	4
Culture	28.9	2.89
Education	95.7	9.57
Other services	91.1	9.11
Total of NT sector	404.9	40.49
TOTAL OF THE BASKET	1000	100

Note: *According to Mihaljek and Klau, 2003

9.2 GRANGER-CAUSALITY TEST RESULTS (WAGE LEVEL AND ANNUAL GROWTH)

Pairwise Granger Causality Tests			
Sample: 1998T1 2004T4			
Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Prob.
T wages do not Granger Cause NT wages	28	53.4005	2.3E-09
NT wages do not Granger Cause T wages		0.33356	0.71978
Lags: 4			
Null Hypothesis:	Obs	F-Statistic	Prob.
T wages do not Granger Cause NT wages	28	3.51270	0.02620
NT wages do not Granger Cause T wages		1.46951	0.25065
Lags: 8			
Null Hypothesis:	Obs	F-Statistic	Prob.
Annual growth of T wages does not Granger Cause Annual growth of NT wages.		6.72803	0.07232
Annual growth of NT wages does not Granger Cause annual growth of T wages	20	4.13122	0.20532

9.3 TESTING THE SERIES FOR STATIONARITY, USING THE ADF TEST

FOR THE SERIES (PR_i)

Null Hypothesis: RP1 has a unit root				
Exogenous: Constant, Linear Trend				
Lag Length: 4 (Automatic based on AIC, MAXLAG=9)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-3.591368	0.0471
Test critical values:	1% level		-4.284580	
	5% level		-3.562882	
	10% level		-3.215267	
*MacKinnon (1996) one-sided p-values.				

Null Hypothesis: PR2 has a unit root				
Exogenous: Constant, Linear Trend				
Lag Length: 4 (Automatic based on AIC, MAXLAG=9)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-5.676949	0.0003
Test critical values:	1% level		-4.284580	
	5% level		-3.562882	
	10% level		-3.215267	
*MacKinnon (1996) one-sided p-values.				

Null Hypothesis: PR3 has a unit root				
Exogenous: Constant, Linear Trend				
Lag Length: 4 (Automatic based on AIC, MAXLAG=9)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-2.993932	0.1498
Test critical values:	1% level		-4.284580	
	5% level		-3.562882	
	10% level		-3.215267	
*MacKinnon (1996) one-sided p-values.				

Null Hypothesis: PR4 has a unit root				
Exogenous: Constant, Linear Trend				
Lag Length: 4 (Automatic based on AIC, MAXLAG=9)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-4.291783	0.0098

Test critical values:	1% level		-4.284580	
	5% level		-3.562882	
	10% level		-3.215267	
*MacKinnon (1996) one-sided p-values.				

FOR THE SERIES(LP_j)

Null Hypothesis: LP1 has a unit root				
Exogenous: Constant, Linear Trend				
Lag Length: 5 (Automatic based on AIC, MAXLAG=9)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-2.828690	0.1987
Test critical values:	1% level		-4.296729	
	5% level		-3.568379	
	10% level		-3.218382	
*MacKinnon (1996) one-sided p-values.				

Null Hypothesis: LP2 has a unit root				
Exogenous: Constant, Linear Trend				
Lag Length: 7 (Automatic based on AIC, MAXLAG=9)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-7.922611	0.0000
Test critical values:	1% level		-4.323979	
	5% level		-3.580623	
	10% level		-3.225334	
*MacKinnon (1996) one-sided p-values.				
Null Hypothesis: LP3 has a unit root				
Exogenous: Constant, Linear Trend				
Lag Length: 7 (Automatic based on AIC, MAXLAG=9)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-6.456636	0.0001
Test critical values:	1% level		-4.323979	
	5% level		-3.580623	
	10% level		-3.225334	
*MacKinnon (1996) one-sided p-values.				

9.4 RESULTS ESTIMATING THE CORRELATION BETWEEN RELATIVE PRICES AND RELATIVE PRODUCTIVITY: DOMESTIC TRANSMISSION MECHANISM

9.4.1 BY MEANS OF THE (OLS) METHOD

Variant I. Testing the correlation between RP1and LP2, LP3

Dependent Variable: LOG(PR1)				
Sample (adjusted): 1998Q2 2006Q4				
Included observations: 35 after adjustments				
Newly-West HAC Standard Errors & Covariance (lag truncation=3)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.005713	0.006061	0.942642	0.3529
LOG(PR1(-1))	0.846672	0.063460	13.34190	0.0000
LOG(LP2(-1))	0.017215	0.006663	2.583779	0.0145
R-squared	0.944328	Mean dependent var		0.193075
Adjusted R-squared	0.940848	S.D. dependent var		0.114022
S.E. of regression	0.027731	Akaike info criterion		-4.250689
Sum squared resid	0.024609	Schwarz criterion		-4.117374
Log likelihood	77.38706	F-statistic		271.3962
Durbin-Watson stat	1.817969	Prob(F-statistic)		0.000000
Dependent Variable: LOG(PR1)				
Sample (adjusted): 1999Q1 2006Q4				
Included observations: 32 after adjustments				
Newly-West HAC Standard Errors & Covariance (lag truncation=3)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(PR1(-1))	0.850237	0.063135	13.46698	0.0000
LOG(LP3(-4))	0.020571	0.009737	2.112645	0.0434
C	0.021636	0.005551	3.897920	0.0005
R-squared	0.928140	Mean dependent var		0.210780
Adjusted R-squared	0.923184	S.D. dependent var		0.102234
S.E. of regression	0.028335	Akaike info criterion		-4.200389
Sum squared resid	0.023283	Schwarz criterion		-4.062976
Log likelihood	70.20622	F-statistic		187.2801
Durbin-Watson stat	1.797403	Prob(F-statistic)		0.000000

Variant II. Testing the correlation between RP2 and LP2, LP3

Dependent Variable: LOG(PR2)				
Sample (adjusted): 1998Q2 2006Q4				

Included observations: 35 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(PR2(-1))	0.579294	0.140379	4.126646	0.0002
LOG(LP2(-1))	0.016210	0.006575	2.465296	0.0192
C	-0.001105	0.009229	-0.119766	0.9054
R-squared	0.743789	Mean dependent var		0.066147
Adjusted R-squared	0.727776	S.D. dependent var		0.047170
S.E. of regression	0.024611	Akaike info criterion		-4.489413
Sum squared resid	0.019383	Schwarz criterion		-4.356098
Log likelihood	81.56473	F-statistic		46.44864
Durbin-Watson stat	1.657679	Prob(F-statistic)		0.000000
Dependent Variable: LOG(PR2)				
Sample (adjusted): 1998Q2 2006Q4				
Included observations: 35 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(PR2(-1))	0.646635	0.135387	4.776209	0.0000
LOG(LP3(-1))	0.019331	0.009640	2.005281	0.0535
C	0.006424	0.008064	0.796643	0.4315
R-squared	0.729162	Mean dependent var		0.066147
Adjusted R-squared	0.712234	S.D. dependent var		0.047170
S.E. of regression	0.025304	Akaike info criterion		-4.433892
Sum squared resid	0.020489	Schwarz criterion		-4.300576
Log likelihood	80.59310	F-statistic		43.07588
Durbin-Watson stat	1.682963	Prob(F-statistic)		0.000000

Variant III. Testing the correlation between PR4 and LP2, LP3

Dependent Variable: LOG(PR4)				
Sample (adjusted): 1998Q2 2006Q4				
Included observations: 35 after adjustments				
Newly-West HAC Standard Errors & Covariance (lag truncation=3)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(PR4(-1))	0.460417	0.151516	3.038737	0.0047
LOG(LP2(-1))	0.023369	0.008301	2.815169	0.0083
C	-0.039084	0.015851	-2.465787	0.0192
R-squared	0.697176	Mean dependent var		0.008736
Adjusted R-squared	0.678250	S.D. dependent var		0.050037
S.E. of regression	0.028382	Akaike info criterion		-4.204287

Sum squared resid	0.025778	Schwarz criterion	-4.070971
Log likelihood	76.57502	F-statistic	36.83604
Durbin-Watson stat	1.486964	Prob(F-statistic)	0.000000

Dependent Variable: LOG(PR4)				
Sample (adjusted): 1998Q2 2006Q4				
Included observations: 35 after adjustments				
White Heteroskedasticity-Consistent Standard Errors & Covariance				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(PR4(-1))	0.522668	0.132069	3.957545	0.0004
LOG(LP3(-1))	0.029948	0.012406	2.414073	0.0217
C	-0.024671	0.013895	-1.775510	0.0853
R-squared	0.670244	Mean dependent var		0.008736
Adjusted R-squared	0.649635	S.D. dependent var		0.050037
S.E. of regression	0.029618	Akaike info criterion		-4.119085
Sum squared resid	0.028070	Schwarz criterion		-3.985770
Log likelihood	75.08399	F-statistic		32.52077
Durbin-Watson stat	1.479982	Prob(F-statistic)		0.000000

9.4.2 By means of the VECM method

Given that the application of the OLS method is not accurate for non-stationary series PR3 and LP1, the BS effect estimated by means of these combinations is obtained from the application of the VECM method. About non-stationary series, first the Johansen cointegration test will be applied, with the following specifications: a deterministic linear trend is assumed and the constant is included in the cointegration equation. The results are reported below:

9.4.2.1 Johansen cointegration test.

LP1

Sample (adjusted): 1998Q3 2006Q4			
Trend assumption: Linear deterministic trend (restricted)			
Series: PR1 LP1			
Lags interval (in first differences): 1 to 1			
Unrestricted Cointegration Rank Test (Trace)			

Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.410945	28.69469	25.87211	0.0217
At most 1	0.270011	10.70065	12.51798	0.0988
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Sample (adjusted): 1998Q3 2006Q4				
Included observations: 34 after adjustments				
Trend assumption: Linear deterministic trend (restricted)				
Series: PR2 LP1				
Lags interval (in first differences): 1 to 1				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.608330	41.31217	25.87211	0.0003
At most 1	0.242498	9.442797	12.51798	0.1548
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Sample (adjusted): 1998Q3 2006Q4				
Included observations: 34 after adjustments				
Trend assumption: Linear deterministic trend (restricted)				
Series: PR3 LP1				
Lags interval (in first differences): 1 to 1				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.381897	27.50164	25.87211	0.0311
At most 1	0.279472	11.14422	12.51798	0.0839
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				
Sample (adjusted): 1998Q3 2006Q4				
Included observations: 34 after adjustments				
Trend assumption: Linear deterministic trend (restricted)				

Series: PR4 LP1				
Lags interval (in first differences): 1 to 1				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.568669	39.24204	25.87211	0.0006
At most 1	0.268968	10.65215	12.51798	0.1005
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

PR3

Sample (adjusted): 1998Q3 2006Q4				
Included observations: 34 after adjustments				
Trend assumption: Linear deterministic trend (restricted)				
Series: PR3 LP2				
Lags interval (in first differences): 1 to 1				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None	0.447427	25.42083	25.87211	0.0568
At most 1	0.143158	5.253061	12.51798	0.5605
Trace test indicates no cointegration at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Sample (adjusted): 1998Q3 2006Q4				
Included observations: 34 after adjustments				
Trend assumption: Linear deterministic trend (restricted)				
Series: PR3 LP3				
Lags interval (in first differences): 1 to 1				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None	0.413230	24.54929	25.87211	0.0724
At most 1	0.172144	6.423141	12.51798	0.4085
Trace test indicates no cointegration at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

9.4.2.2 VEC Model

It results from the Johansen test that the LP1 series has cointegrating relationships with all relative price estimations, whereas the series RP3 does not reflect such a relationship with LP2 and LP3 estimations of relative productivity.

As a second step, we construct the VEC model. There is estimated only the equation that models relative prices as a dependent variable on relative productivity. There are accepted only statistically significant coefficients. The VEC model has the following form:

$$\Delta Y_t = \alpha \left[Y_{t-1} - c - \beta \cdot X_{t-1} \right] + \lambda_1 \cdot \Delta Y_{t-1} + \delta_1 \Delta X_{t-1} + w_t$$

where Y and X are the variables, Δ is the operator of the change, $\alpha, \beta, \lambda, \delta_1$ are the parameters and w_t is the error term.

Important coefficients for the VEC model are α, the indicator of the speed of adjustment to equilibrium and β, the long-run relationship coefficient. The indicator of the speed of adjustment to equilibrium shows in percentage points the speed at which relative prices move toward restoring the equilibrium over the following period, in case of deviation from this level. So, α should be negative, less than one, whereas the long-term relationship coefficient shows relative price elasticity in terms of long-run relative productivity.

- The relation between RP1 and LP1 is given by the following equation.

D(LOG(PR1)) = C(1)*(LOG(PR1(-1)) - 0.009*LOG(LP1(-1)) - 0.009*@TREND(98Q1) + 0.001) +C(2)*D(LOG(PR1(-1)))+ + C(4)*D(LOG(PR1(-4))) + C(9)*D(LOG(LP1(-5)))+ C(10)

System: SYS_PR1_LP1				
Estimation Method: Least Squares				
Sample: 1999Q3 2006Q4				
Included observations: 30				
Total system (balanced) observations 30				
	Coefficient	Std. Error	t-Statistic	Prob.

C(1)	-0.626964	0.131329	-4.773993	0.0001
C(2)	0.420961	0.124368	3.384799	0.0024
C(4)	0.466169	0.123497	3.774724	0.0009
C(9)	-0.018493	0.008049	-2.297453	0.0302
C(10)	0.002547	0.003730	0.682994	0.5009
Determinant residual covariance		0.000238		
R-squared	0.718756	Mean dependent var		0.011512
Adjusted R-squared	0.673757	S.D. dependent var		0.029615
S.E. of regression	0.016916	Sum squared resid		0.007154
Durbin-Watson stat	1.893514			

It results from the estimated equation that there exists a long-run relationship between relative prices and relative productivity. In this case, the return to equilibrium coefficient C(1) (-0.62) indicates that in case of deviation from equilibrium, relative prices would turn at this level within the following quarter, at 62 percent. Also, in the long run, relative prices would be affected by 0.09 percent from a 10 percent relative productivity growth.

In the short run, relative prices would react by 42 and 47 percent to a positive shock of these prices in the preceding periods, whereas they would decrease by 2 percent to a relative productivity shock. The short-term behaviour of relative prices is affected mainly from their performance in the past periods, rather than from relative productivity.

- The relationship between RP2 and LP1 is given by the following equation.

D(LOG(PR2)) = C(1)*(LOG(PR2(-1)) - 0.002*LOG(LP1(-1)) - 0.004*@TREND(98Q1) + 0.005) + C(2)*D(LOG(PR2(-1))) +C(3)*D(LOG(PR2(-4)))+ C(9)*D(LOG(LP1(-5)))+ C(10)

System: SYS_PR_2_LP1				
Sample: 1999Q3 2006Q4				
Included observations: 30				
Total system (balanced) observations 30				
	Coefficient	Std. Error	t-Statistic	Prob.

C(1)	-0.884130	0.137238	-6.442302	0.0000
C(2)	0.534851	0.097529	5.484013	0.0000
C(3)	0.456375	0.097244	4.693085	0.0001
C(9)	-0.009933	0.005260	-1.888601	0.0706
C(10)	0.000599	0.002083	0.287764	0.7759
Determinant residual covariance		9.42E-05		
R-squared	0.868929	Mean dependent var		0.004754
Adjusted R-squared	0.847958	S.D. dependent var		0.027272
S.E. of regression	0.010634	Sum squared resid		0.002827
Durbin-Watson stat	1.638364			

Relative productivity elasticity to relative prices RP2 is 0.02. This means that an increase by 10 percent of the LP1 would augment PR2 by 0.2 percent. The return to equilibrium coefficient -0.88 indicates that the adjustment to equilibrium takes place quickly. At the meantime, the response of relative prices RP2 to shocks on their past performance and on relative productivity are obtained from the coefficients C(2), C(3) and C(9).

- The relationship between RP3 and LP1 is given by the following equation:

D(LOG(PR3)) = C(1)*(LOG(PR3(-1)) + 0.04*LOG(LP1(-1)) - 0.01*@TREND(98Q1) + 0.03) + C(2)*D(LOG(PR3(-1))) + C(3)*D(LOG(PR3(-3))) + C(9)*D(LOG(LP1(-1))) + C(10)

System: SYS_PR3_LP1				
Estimation Method: Least Squares				
Sample: 1999Q1 2006Q4				
Included observations: 32				
Total system (balanced) observations 32				
	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.652063	0.153452	-4.249287	0.0002
C(2)	0.634032	0.207025	3.062579	0.0049
C(3)	0.405133	0.175891	2.303321	0.0292
C(9)	-0.012777	0.011170	-1.143855	0.2627
C(10)	0.001049	0.005646	0.185780	0.8540

Determinant residual covariance		0.000482		
R-squared	0.500306	Mean dependent var		0.012075
Adjusted R-squared	0.426277	S.D. dependent var		0.031556
S.E. of regression	0.023902	Sum squared resid		0.015425
Durbin-Watson stat	1.928874			

There exists a long run relationship between RP3 and LP1. In this case, the return to equilibrium coefficient (-0.65) indicates that, in case of deviation from equilibrium, relative prices would turn to equilibrium at 65 percent within the coming quarter. Also, in the long run, a 10 percent growth of relative productivity would bring about 0.4 percent relative price rise.

- The relationship between RP4 and LP1 is given by the following equation.

D(LOG(PR4)) = C(1)*(LOG(PR4(-1)) + 0.02*LOG(LP1(-1)) - 0.004*@TREND(98Q1) + 0.05) + C(2)*D(LOG(PR4(-1))) + C(4)*D(LOG(PR4(-3))) + C(5)*D(LOG(PR4(-4))) + C(9)*D(LOG(LP1(-4))) + C(10)

System: SYS_PR4_LP1				
Estimation Method: Least Squares				
Sample: 1999Q2 2006Q4				
Included observations: 31				
Total system (balanced) observations 31				
	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.958674	0.105158	-9.116545	0.0000
C(2)	0.830331	0.157688	5.265662	0.0000
C(4)	0.465488	0.154901	3.005071	0.0060
C(5)	0.400795	0.067238	5.960826	0.0000
C(9)	0.012001	0.005652	2.123129	0.0438
C(10)	-0.002705	0.002569	-1.052942	0.3024
Determinant residual covariance		0.000104		
R-squared	0.877317	Mean dependent var		0.005303
Adjusted R-squared	0.852780	S.D. dependent var		0.029559
S.E. of regression	0.011341	Sum squared resid		0.003216
Durbin-Watson stat	1.510430			

There exists a long run relationship between relative prices measured by the RP4 and relative productivity estimated by the LP1. The indicator measuring the speed of return C(1) denotes that relative prices would close the gap versus the equilibrium level during the coming period of time, by 96 percent. In the long run, 10 percent relative productivity growth would bring about 0.2 percent relative price rise.

In the short run, relative price response to a positive shock of relative prices over past periods - RP4(-1), RP4(-3) and RP4(-4) - would be 83, 46 and 40 percent rise, respectively, whereas a 10 percent LP1 growth would bring about 0.12 percent relative price rise. It is obvious that short-run relative price behaviour is affected mainly from their performance in the preceding periods rather than from relative productivity.

9.5 RESULTS ESTIMATING THE RELATIVE PRICE AND RELATIVE PRODUCTIVITY RELATIONSHIP. INTERNATIONAL BS EFFECT

9.5.1 Testing the series for stationarity, using the ADF test

Relative prices PR_ex=ICK/HCPI

Null Hypothesis: PR_EX has a unit root				
Exogenous: Constant, Linear Trend				
Lag Length: 8 (Automatic based on AIC, MAXLAG=9)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-4.018331	0.0203
Test critical values:	1% level		-4.339330	
	5% level		-3.587527	
	10% level		-3.229230	
*MacKinnon (1996) one-sided p-values.				

SERIES OF CROSS-COUNTRY RELATIVE PRODUCTIVITIES VE LP(i)_EX

LP1_EX=LP1/LP1_EU

Null Hypothesis: LP1_EX has a unit root				
Exogenous: Constant, Linear Trend				
Lag Length: 5 (Automatic based on AIC, MAXLAG=9)				

			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-2.763822	0.2205
Test critical values:	1% level		-4.296729	
	5% level		-3.568379	
	10% level		-3.218382	
*MacKinnon (1996) one-sided p-values.				

LP2_EX=LP2/LP1_EU

Null Hypothesis: LP2_EX has a unit root				
Exogenous: Constant, Linear Trend				
Lag Length: 7 (Automatic based on AIC, MAXLAG=9)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-7.995456	0.0000
Test critical values:	1% level		-4.323979	
	5% level		-3.580623	
	10% level		-3.225334	
*MacKinnon (1996) one-sided p-values.				

LP3_EX=LP3/LP1_EU

Null Hypothesis: LP3_EX has a unit root				
Exogenous: Constant, Linear Trend				
Lag Length: 7 (Automatic based on AIC, MAXLAG=9)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-6.157469	0.0001
Test critical values:	1% level		-4.323979	
	5% level		-3.580623	
	10% level		-3.225334	
*MacKinnon (1996) one-sided p-values.				

LP4_EX=LP1/LP2_EU

Null Hypothesis: LP4_EX has a unit root				
Exogenous: Constant, Linear Trend				
Lag Length: 5 (Automatic based on AIC, MAXLAG=9)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-2.743953	0.2275
Test critical values:	1% level		-4.296729	
	5% level		-3.568379	
	10% level		-3.218382	
*MacKinnon (1996) one-sided p-values.				

LP5_EX=LP2/LP2_EU

Null Hypothesis: LP5_EX has a unit root				
Exogenous: Constant, Linear Trend				
Lag Length: 7 (Automatic based on AIC, MAXLAG=9)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-8.071023	0.0000
Test critical values:	1% level		-4.323979	
	5% level		-3.580623	
	10% level		-3.225334	
*MacKinnon (1996) one-sided p-values.				

LP6_EX=LP3/LP2_EU

Null Hypothesis: LP6_EX has a unit root				
Exogenous: Constant, Linear Trend				
Lag Length: 8 (Automatic based on AIC, MAXLAG=9)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-2.439063	0.3530
Test critical values:	1% level		-4.339330	
	5% level		-3.587527	
	10% level		-3.229230	
*MacKinnon (1996) one-sided p-values.				

9.5.2 Results estimating relative price and relative productivity relationship by OLS method

EQUATION 6.2.1/A

Dependent Variable: LOG(PR_EX)				
Sample (adjusted): 1999Q2 2006Q4				
Included observations: 31 after adjustments				
Newey-west HAC Standard Errors & Covariance (lag truncation=3)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(PR_EX(-1))	0.428418	0.065806	6.510345	0.0000
LOG(ER(-4))	0.380374	0.162543	2.340146	0.0269
LOG(LP2_EX)	0.010583	0.001423	7.438415	0.0000
C	-0.016271	0.003423	-4.753170	0.0001
R-squared	0.595991	Mean dependent var		0.007339
Adjusted R-squared	0.551101	S.D. dependent var		0.023595
S.E. of regression	0.015809	Akaike info criterion		-5.336589
Sum squared resid	0.006748	Schwarz criterion		-5.151558
Log likelihood	86.71713	F-statistic		13.27671
Durbin-watson stat	1.837930	Prob(F-statistic)		0.000016

Dependent Variable: LOG(PR_EX)				
Sample (adjusted): 1999Q2 2006Q4				
Included observations: 31 after adjustments				
white Heteroskedasticity-Consistent Standard Errors & Covariance				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(PR_EX(-1))	0.437259	0.087638	4.989372	0.0000
LOG(ER(-4))	0.394333	0.147788	2.668229	0.0127
LOG(LP3_EX)	0.013222	0.002839	4.657504	0.0001
C	-0.008288	0.004185	-1.980340	0.0579
R-squared	0.591135	Mean dependent var		0.007339
Adjusted R-squared	0.545706	S.D. dependent var		0.023595
S.E. of regression	0.015903	Akaike info criterion		-5.324643
Sum squared resid	0.006829	Schwarz criterion		-5.139612
Log likelihood	86.53196	F-statistic		13.01217
Durbin-watson stat	1.825884	Prob(F-statistic)		0.000019

Dependent Variable: LOG(PR_EX)				
Sample (adjusted): 1999Q2 2006Q4				
Included observations: 31 after adjustments				
Newey-west HAC Standard Errors & Covariance (lag truncation=3)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(PR_EX(-1))	0.427886	0.065177	6.564974	0.0000
LOG(LP5_EX)	0.010811	0.001472	7.345175	0.0000
LOG(ER(-4))	0.381291	0.161883	2.355347	0.0260
C	-0.016632	0.003637	-4.573105	0.0001
R-squared	0.600758	Mean dependent var		0.007339
Adjusted R-squared	0.556397	S.D. dependent var		0.023595
S.E. of regression	0.015715	Akaike info criterion		-5.348458
Sum squared resid	0.006668	Schwarz criterion		-5.163428
Log likelihood	86.90111	F-statistic		13.54270
Durbin-watson stat	1.836793	Prob(F-statistic)		0.000014

EQUATION 6.2.1/B

Dependent Variable: DLOG(PR_EX)				
Sample (adjusted): 1999Q3 2006Q4				
Included observations: 30 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLOG(PR_EX(-2))	-0.650882	0.111184	-5.854092	0.0000
DLOG(ER(-4))	0.183327	0.081312	2.254614	0.0328
DLOG(LP2_EX(-3))	0.012335	0.006924	1.781613	0.0865

C	-9.41E-05	0.002436	-0.038642	0.9695
R-squared	0.679444	Mean dependent var		0.000679
Adjusted R-squared	0.642457	S.D. dependent var		0.021434
S.E. of regression	0.012817	Akaike info criterion		-5.752593
Sum squared resid	0.004271	Schwarzwcriterion		-5.565767
Log likelihood	90.28890	F-statistic		18.36968
Durbin-watson stat	2.036618	Prob(F-statistic)		0.000001
Dependent Variable: DLOG(PR_EX)				
Sample (adjusted): 1999Q3 2006Q4				
Included observations: 30 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLOG(PR_EX(-2))	-0.666706	0.109854	-6.069005	0.0000
DLOG(ER(-4))	0.197766	0.078199	2.528994	0.0178
DLOG(LP3_EX(-3))	0.014277	0.007548	1.891522	0.0697
C	0.000315	0.002362	0.133317	0.8950
R-squared	0.683819	Mean dependent var		0.000679
Adjusted R-squared	0.647337	S.D. dependent var		0.021434
S.E. of regression	0.012729	Akaike info criterion		-5.766336
Sum squared resid	0.004213	Schwarz criterion		-5.579510
Log likelihood	90.49505	F-statistic		18.74380
Durbin-Watson stat	2.062238	Prob(F-statistic)		0.000001

Dependent Variable: DLOG(PR_EX)				
Sample (adjusted): 1999Q3 2006Q4				
Included observations: 30 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLOG(PR_EX(-4))	0.694379	0.095716	7.254598	0.0000
DLOG(LP5_EX(-3))	0.011433	0.006088	1.878116	0.0716
DLOG(ER(-4))	0.168811	0.071895	2.348015	0.0268
C	-0.000427	0.002146	-0.199024	0.8438
R-squared	0.751240	Mean dependent var		0.000679
Adjusted R-squared	0.722537	S.D. dependent var		0.021434
S.E. of regression	0.011290	Akaike info criterion		-6.006162
Sum squared resid	0.003314	Schwarz criterion		-5.819335
Log likelihood	94.09242	F-statistic		26.17277
Durbin-watson stat	2.528179	Prob(F-statistic)		0.000000

9.5.3 Results estimating relative price and relative productivity relationship by VECM method

9.5.3.1 Cointegration Johansen test

Sample (adjusted): 1998Q4 2006Q4				
Included observations: 33 after adjustments				
Trend assumption: Linear deterministic trend (restricted)				
Series: PR_EX LP1_EX ER				
Lags interval (in first differences): 1 to 1				
Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.655948	52.80032	42.91525	0.0039
At most 1	0.265706	17.59055	25.87211	0.3721
At most 2	0.200845	7.398628	12.51798	0.3048
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Sample (adjusted): 1998Q3 2006Q4				
Included observations: 34 after adjustments				
Trend assumption: Linear deterministic trend (restricted)				
Series: PR_EX LP4_EX ER				
Lags interval (in first differences): 1 to 1				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.712999	67.10177	42.91525	0.0000
At most 1	0.381125	24.66066	25.87211	0.0702
At most 2	0.217657	8.345695	12.51798	0.2247
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Sample (adjusted): 1998Q3 2006Q4				
Included observations: 34 after adjustments				
Trend assumption: Linear deterministic trend (restricted)				
Series: PR_EX LP6_EX ER				
Lags interval (in first differences): 1 to 1				
Hypothesized		Trace	0.05	

No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.676067	60.32364	42.91525	0.0004
At most 1	0.355046	21.99826	25.87211	0.1409
At most 2	0.188143	7.086663	12.51798	0.3356
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

9.5.3.2 VEC MODEL

Given that relative productivity series LP1_ex, LP4_ex and LP6_ex did not result stationary at level, we will use the VEC model to estimate the BS effect, as in the case of estimating the BS domestic effect.

- LP1_Ex relationship

D(LOG(PR_EX)) = C(1)*(LOG(PR_EX(-1)) + 0.03*LOG(LP1_EX(-1)) + 0.4*ER_R(-1) - 0.003*@TREND(98Q1) + 0.02) + C(2)*D(LOG(PR_EX(-1))) + C(3)*D(LOG(PR_EX(-4))) + C(4)*D(LOG(LP1_EX(-1))) + C(6)*D(LOG(ER(-4))) + C(8)

System: SYS_LP1_EX_R				
Estimation Method: Least Squares				
Sample: 1999Q3 2006Q4				
Included observations: 30				
Total system (balanced) observations 30				
	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.448739	0.151739	-2.957301	0.0069
C(2)	0.359008	0.134253	2.674108	0.0133
C(3)	0.517416	0.110240	4.693546	0.0001
C(4)	0.011412	0.005487	2.079594	0.0484
C(6)	0.208286	0.065928	3.159299	0.0042
C(8)	-0.000583	0.001972	-0.295811	0.7699
Determinant residual covariance		8.82E-05		
R-squared	0.801339	Mean dependent var		0.000679
Adjusted R-squared	0.759951	S.D. dependent var		0.021434
S.E. of regression	0.010502	Sum squared resid		0.002647
Durbin-Watson stat	2.547513			

The return to equilibrium parameter is (-0.44), so one percent deviation of relative prices would turn to equilibrium within the following quarter, at 44 percent. The coefficient of the long run relationship indicated that 10 percent relative productivity growth would be translated into 0.3 percent relative price growth for this time frame. It results out of the short run dynamics that relative price behaviour is affected mainly by past series itself and by exchange rate developments (the coefficient before this variable indicates that a 10 percent depreciation of the lek/euro exchange rate would augment relative prices by about 21 percent within the year). In the meantime, relative productivity elasticity to relative prices is 0.01. Relative productivity growth by 10 percent would bring about 0.1 percent relative price rise in the following quarter. Similarly are interpreted the equations that model the relationship between two estimations of the relative productivity between Albania and the euro area (LP4_ex and LP6_ex) and the relative prices estimated by PR_ex.

- LP4_ex relationship

D(PR_EX) = C(1)*(PR_EX(-1) + 0.02*LP4_EX(-1) + 0.5*ER_R(-1) - 0.004*@TREND(98Q1) - 0.9) C(2)*D(PR_EX(-1)) + C(3)*D(PR_EX(-4)) + C(4)*D(LP4_EX(-1)) + + C(6)*D(LOG(ER(-4))) + C(8)

System: SYS_LP4_EX_R				
Estimation Method: Least Squares				
Sample: 1999Q3 2006Q4				
Included observations: 30				
Total system (balanced) observations 30				
	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.271920	0.123132	-2.208358	0.0370
C(2)	0.281828	0.138202	2.039242	0.0526
C(3)	0.545584	0.116446	4.685286	0.0001
C(4)	0.003983	0.001797	2.216560	0.0364
C(6)	0.216704	0.070217	3.086209	0.0051
C(8)	-0.000333	0.002090	-0.159315	0.8748
Determinant residual covariance		0.000100		
R-squared	0.776052	Mean dependent var		0.000692
Adjusted R-squared	0.729397	S.D. dependent var		0.021493

S.E. of regression	0.011181	Sum squared resid	0.003000
Durbin-Watson stat	2.432465		

- LP6_ex relation

D(PR_EX) = C(1)*(PR_EX(-1) + 0.01*LP6_EX(-1) + 0.5*ER_R(-1) - 0.004*@TREND(98Q1) - 0.9) + C(2)*D(PR_EX(-1)) + C(3)*D(PR_EX(-4)) + C(4)*D(LP6_EX(-3))+ C(6)*D(ER_R(-4)) + C(8)

System: SYS_LP6_EX_R				
Estimation Method: Least Squares				
Sample: 1999Q3 2006Q4				
Included observations: 30				
Total system (balanced) observations 30				
	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.303205	0.126437	-2.398081	0.0246
C(2)	0.245400	0.115216	2.129919	0.0436
C(3)	0.602479	0.100211	6.012123	0.0000
C(4)	0.005835	0.002869	2.033523	0.0532
C(6)	0.203518	0.066134	3.077353	0.0052
C(8)	-0.000539	0.001945	-0.276981	0.7842
Determinant residual covariance		8.63E-05		
R-squared	0.806740	Mean dependent var		0.000692
Adjusted R-squared	0.766477	S.D. dependent var		0.021493
S.E. of regression	0.010386	Sum squared resid		0.002589
Durbin-Watson stat	2.652232			

The results estimating relative price and productivity relationship by disaggregation REER method

9.5.4 Testing the series for stationarity, using the ADF test

Null Hypothesis: D(REER_BS) has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic based on SIC, MAXLAG=7)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-4.509760	0.0011

Test critical values:	1% level		-3.653730	
	5% level		-2.957110	
	10% level		-2.617434	
*MacKinnon (1996) one-sided p-values.				

Null Hypothesis: D(REER) has a unit root				
Exogenous: Constant				
Lag Length: 1 (Automatic based on SIC, MAXLAG=7)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-9.216127	0.0000
Test critical values:	1% level		-3.653730	
	5% level		-2.957110	
	10% level		-2.617434	
*MacKinnon (1996) one-sided p-values.				

9.5.5. (Johansen Cointagration Test Summary

Sample: 1998Q1 2006Q4					
Included observations: 34					
Series: REER REER_BS					
Lags interval: 1 to 2					
Data Trend:	None	None	Linear	Linear	Quadratic
Test Type	No Intercept	Intercept	Intercept	Intercept	Intercept
	No Trend	No Trend	No Trend	Trend	Trend
Trace	1	2	0	0	0
Max-Eig	1	2	1	0	0
*Critical values based on MacKinnon-Haug-Michelis (1999)					

Cointegration Vector Results

Sample: 1999Q1 2006Q4				
Included observations: 34				
Trend assumption: No deterministic trend				
Series: REER REER_BS				
Lags interval (in first differences): 1 to 2				
Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.232538	12.34441	12.32090	0.0495
At most 1	0.114052	3.875103	4.129906	0.0582
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level				

* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				
Normalized cointegrating coefficients (standard error in parentheses)				
REER	REER_BS			
1.000000	-0.020172			
	(0.03419)			
Adjustment coefficients (standard error in parentheses)				
D(REER	-0.009003			
	(0.05682)			
D(REER_BS)	-0.11679			
	(0.04084)			

ENDNOTES

** Evelina Çeliku, Rajna Hoxholli, Monetary Policy Department, Bank of Albania.*

The views in this paper are of the authors and do not necessarily reflect those of the Bank of Albania.

[1] Analogue terms would be: exchangeable and non-exchangeable.

[2] According to this theory, the economy of a country is divided into two sectors, i.e. the tradable and non-tradable sectors.

[3] In such a case Albania is included.

[4] For example, transition economies, candidate countries, those aspiring EU membership.

[5] One or all the EU member states.

[6] Mihajljek et al.,2003; Egert, 2004; Rother, 2000; Coricelli et al., 2001 etc..

[7] The research is not focused only on main trading partners of Albania (Greece, Italy, etc.), but also on the strategic partner, the EU.

[8] Unpublished estimates.

[9] Annual Report 2007 of the Bank of Albania.

[10] Average coefficients to benefit for each quarter are respectively: 20; 25; 26 and 29 %, with slight changes from one sector of the economy to another.

[11] Downward unemployment rate, INSTAT, 2005, 2006, 2007.

[12] Internet website of the Eurostat http://epp.eurostat.ec.europa.eu.

[13] Albania has already signed some important agreements.

[14] Export figure for the economy results as a weighted average of exports with the sectors' share.

[15] This share has undergone a very rapid growth over 2005-2006 period for transport and telecommunication, 17.7 %.

[16] Table 3.1, page 9.

[17] Çeliku and Shtylla, part of the material submitted to the IMF Mission, October 2006 (for internal use).

[18] BoA working paper, Çeliku, 2003; Lazar 2005, material submitted to the IMF Mission (for internal use); Çeliku 2005, review of T and NT process (material for internal use).

[19] The simple mean for the three estimations of productivity for 1998 – 2006.

[20] Bank of Albania: Survey on "Consumer confidence index", Special section, September 2004.

[21] Bank of Albania, Survey on "Consumer confidence index", first

quarter, 2007.

[22] To understand the reader: in the first case the transport and telecommunication are included in the tradable sector(Dif_T_NT) and in the second case in that of the NT (Dif_T_NT_1).

[23] The wage ratio refers to the period of 2000 – 2004. Annual frequency data, INSTAT: ASN and LSMS (2004).

[24] Bank of Albania: Regional survey on "Regional economic activity of businesses" T3 – 2005 and T1 – 2007. The data are quarterly and for first three quarters, they are results of the testing stage of the respective survey. Therefore, they are less comparable to the results of the preceding stages.

[25] Vector Error Correction Model.

[26] In the ADF test, the lags were selected to minimise the Akaike Information Criteria and the trend and the intercept were included in the estimation, taking into account the series chart.

[27] The estimating technique for non-stationary series is reported at Appendix 9.5.2.

[28] The data on other countries are obtained from the research by Mihaljek and Klau (2003). They belong to a broader database both, in time and variety. Anyway, the estimation approach is almost the same.

[29] The data in the last column are interpreted as follows: of a rise by one unit in the overall price level, x unit is explained by productivity differential. x is obtained from the last column of the table.

[30] Average of the ß coefficients of the third of Table 6.

[31] Average of ß coefficients of the sixth column of Table 6.

[32] The use of CPI-based (PPI) REER, (in Çeliku, 2006 – unpublished material) has not given any accurate results; therefore, it has not been taken into consideration in this paper.

[33] According to 3.2.9 relation.

[34] According to stipulation that a decrease in the REER index implies national currency's appreciation.

[35] REER_G5, takes into consideration even Turkey and China (with which trade exchanges are effected in usd). The reasons supporting this new approach of BS effect estimation are explained earlier in the paper.

[36] According to Egert, 2003, the rent price for the transition countries is subject to a slow process of adjustment to market prices. These economies are characterised by a conditioned supply for construction, which is associated with the bubble phenomenon.

CIP Katalogimi në botim BK Tiranë

Çeliku Evelina, Hoxholli Rajna
An estimation of Balassa-Samuelson effect in Albania
/ Çeliku Evelina, Hoxholli Rajna - Tiranë:
Banka e Shqipërisë, nëntor, 2007

-72 f; 15.3 x 23 cm. (material diskutimi ..)

Bibliogr.
ISBN 978-99956-42-10-5

338.23(496.5) :336.74

You may find this paper in the following address:

www.bankofalbania.org

If you want to receive a hard copy of this paper, write to us at:

Banka e Shqipërisë
Sheshi "Skënderbej" Nr.1 Tiranë Shqipëri,
Tel.: +355-(0)4-2222152;
Faks: +355-(0)4-2223558

or send an e-mail to:

public@bankofalbania.org

Printed in 250 copies