

# In Search of the Lost Balassa–Samuelson Effect – The Changing Role of Services in the 21st Century\*

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*It is a generally observed phenomenon that there is a positive relationship between the level of economic development and the general price level. According to the Balassa–Samuelson effect, the convergence observed in the price level is largely achieved through higher services inflation. Based on the update of our previous regression estimation results on the effect, the textbook Balassa–Samuelson effect can be detected less and less in the case of Hungary. Moreover, the phenomenon also shows a similar shift in the case of a wider group of countries. The structural transformation taking place in the world economy nowadays, globalisation and the infocommunication revolution are fundamentally transforming the role, tradability and productivity of services, which also influences the fulfilment of the assumptions of the theory. These factors – in particular with regard to market services – have been assessed in terms of several aspects: based on growth patterns, the role of the services sector in the growth path of modern economies is becoming increasingly important, which is proved by both international and domestic data. Current megatrends – such as globalisation, digitalisation, technological development and artificial intelligence – are accelerating the rising productivity of services and leading to changes in consumer habits and the globalisation of services. New structural shifts affecting the services sector are also transforming the conditions associated with the theory, thus weakening the practical operability of the Balassa–Samuelson effect.*

**Journal of Economic Literature (JEL) codes:** E31, F15, F18, F43, F63, O10, O30

**Keywords:** services, inflation, Balassa–Samuelson effect, growth, megatrends, productivity

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\* The papers in this issue contain the views of the authors which are not necessarily the same as the official views of the Magyar Nemzeti Bank.

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## 1. Introduction

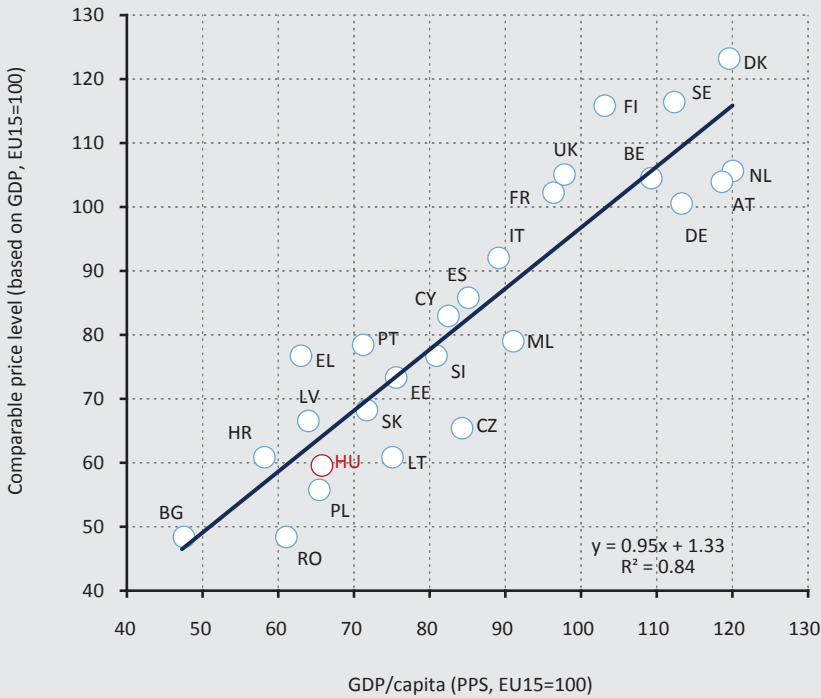
It is a generally observed phenomenon that a positive relationship can be identified between the development of economies and the price level, with the result that the real convergence of countries leads to similar convergence in price developments as well. To understand the link between the development of individual economies and prices, it is worth thinking about the important relationships in international economics such as purchasing power parity. Based on the theory of purchasing power parity dating back to 1916, the relative price of consumer baskets expressed in consumer baskets of other countries is constant over time and has a value of 1 (*Cassel 1916*). In practice, however, the hypothesis of purchasing power parity fails, at least over the short term, i.e. the price of consumer baskets expressed in the same currency will not necessarily be the same across all countries. Studies on the subject, dating back to the 1970s (*Kravis et al. 1978, Rogoff 1996*), point out that these systematic differences may be smaller for higher-income ('richer') countries, while they may be larger for low-income countries.

Analysing the correlation between development and price level based on data for European Union countries, we can identify a strong positive relationship (*Figure 1*). In the comparison, we approximated the development to the level of GDP per capita on a purchasing power basis relative to the EU15. The EU15 was also the benchmark for comparable price levels, as these countries can be considered as the group of developed EU countries.<sup>1</sup> On the one hand, based on the 2018 data, the general observation according to the theory can be confirmed, which states that comparable price levels in developed countries are higher than in developing countries. On the other hand, the regression line indicates that development explains more than 80 per cent of the difference in price levels between countries.

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<sup>1</sup> The group of EU15 countries includes countries that were already members of the European Union before 1 May 2004. These countries are: Austria, Belgium, Denmark, the United Kingdom, Finland, France, Greece, the Netherlands, Ireland, Luxembourg, Germany, Italy, Portugal, Spain, Sweden.

**Figure 1**  
Comparable price levels as a function of economic development, 2018



Note: The figure does not show the outlier countries biasing the regression, Luxembourg and Ireland.

Source: Eurostat

Narrowing the focus of the study, in terms of the empirical literature dealing with the relationship between development and price level, we can highlight the studies that focus on Hungary and the countries of the Central and Eastern European region. Estimating the degree of price convergence associated with real convergence is addressed by *Égert et al. (2005)*, *Darvas and Szapáry (2008)* and *Bauer (2015)*. Regarding the average price convergence associated with a 1 per cent growth surplus, *Égert et al. (2005)* obtained as a result 0.8 per cent, *Darvas and Szapáry (2008)* 1.0 per cent, and *Bauer (2015)* found a range of 0.5–1.0 per cent.

The Balassa–Samuelson effect, which is of key importance for the study (hereinafter we refer to it as B–S effect too), is attributed to Béla Balassa and Paul Samuelson, who came to a similar conclusion independently in the early 1960s. The ‘main actors’ of the B–S effect are the well-distinguished traded and non-traded, i.e. industry and services sectors, the relationship of which and the factors shaping this relationship are examined in the first half of the study. According to the B–S effect (*Balassa 1964; Samuelson 1964*), there is an increase in productivity in industrial

goods being traded, which contributes to an increase in the wages in the sector. As the labour market of each sector within a given economy cannot be separated from each other, this wage increase spills over also to the services sector, thus contributing to the rise in the prices of – less productive – services. We also test the theory empirically for the European Union countries and then pay special attention to presenting the domestic and regional results within this group of countries. The aim of this part of our study is to test the Balassa–Samuelson effect on the data that have become available in the meantime, and to compare the results with the previous estimation results.

The second part of the study seeks to answer the question of which changes have significantly transformed the services sector and its role in the world's economies over the past 50 years. The recent structural transformation of economies, globalisation and the infocommunication revolution are causing changes in the role, tradability and productivity of services which, in our view, are changing the fulfilment of the necessary conditions for the Balassa–Samuelson effect (see *Section 2*). All of these aspects are explained in more detail in the individual sections and subsections. In this part of our study, the global approach comes to the fore, which directly or indirectly influences European – including regional and domestic – processes over the longer term.

The structure of the study is as follows: in *Part 2*, we analyse the Balassa–Samuelson effect and present the results of the related domestic studies. *Sections 3* and *4* analyse the factors that transform the role, productivity, and tradability of services, respectively. Finally, *Section 5* summarises our key conclusions.

## **2. The Balassa–Samuelson effect as a correlation explaining the relationship between price level and development**

According to traditional economic thinking, the convergence observed in the price level is achieved through the inflation of services. As stated in the introduction, according to the Balassa–Samuelson effect, as the labour markets of the sectors within the countries are not completely independent of each other, wage growth in the industry spills over to the services sector, leading to higher prices for services. However, this process only takes place if certain assumptions are fulfilled.

*The following assumptions traditionally form the basis for the Balassa–Samuelson effect (Bauer 2015:17):*

- 1) ‘Emerging countries converge primarily through improvement in traded productivity, while non-traded productivity can be increased to a lesser degree. Take automobile manufacturing and hairdressing as examples: through the use of more advanced technologies, the productivity of automobile manufacturing – as a sector producing traded goods – can be improved significantly, while the productivity of hairdressing – a nontraded service – is likely to be very similar in developed and less developed countries.
- 2) Expressed in the same currency, traded prices are identical in all countries. The assumption is only valid if trade is completely free of charge and the quality of products is fully identical. If trade is costly (as it is in reality), the only thing that can be taken for granted is the co-movement of prices over the long run; for the B-S effect to take hold, however, even this is sufficient.
- 3) Wages are equalised between the traded and non-traded sectors. This concept is based on the assumption that the labour force can move freely between the two sectors (but not between countries). In reality, the two sectors may require different sets of skills, which may justify different wage levels. For the B–S effect to be valid, however, the long-term co-movement of wages is sufficient, which is a less restrictive assumption.’

### **2.1. The role of the Balassa-Samuelson effect in price level convergence in Hungary**

After reviewing the assumptions associated with the theory, we focus on exploring the role of the Balassa–Samuelson effect in the convergence of the domestic price level, which we illustrate by presenting our estimation results. In his study, *Bauer (2015)* examines the B–S effect in Hungary and in the countries of the region in the period between 2001 and 2013, which we extended until 2018 in this study. The starting point for the dynamic analysis of the B–S effect is that, according to the two-sector neoclassical model, the relationship between prices and productivity in the industrial and the services sectors can be described with the following relationship by assuming perfect capital mobility and exogenous interest rates (*Obstfeld – Rogoff 1997:208*):

$$\Delta p^{NT} - \Delta p^T = \frac{\mu_L^{NT}}{\mu_L^T} (\Delta prod^T - \Delta prod^{NT}), \quad (1)$$

where  $\Delta p^{NT}$  denotes the inflation of services,  $\Delta p^T$  the inflation of industrial goods,  $\Delta prod^T$  and  $\Delta prod^{NT}$  the average productivity growth in the industrial and services sectors, and  $\mu_L^{NT}$  and  $\mu_L^T$  the sectoral share of labour in the services and industrial sectors, on the assumption that  $\frac{\mu_L^{NT}}{\mu_L^T} \geq 1$ . The variables are logarithmic differences, and  $\Delta$  suggests that we will obtain percentage changes (growth rates) as a result.

The correlation can also be written to the average level of labour productivity, taking the advantage of the favourable feature of the Cobb–Douglas production function, according to which the marginal product of labour is equal to the average labour productivity.<sup>2</sup> In this case,

$$\frac{P^{NT}}{P^T} = \frac{\mu_L^T}{\mu_L^{NT}} \cdot \frac{\frac{Y^T}{L^T}}{\frac{Y^{NT}}{L^{NT}}}, \quad (2)$$

where  $P^{NT}$  and  $P^T$  denote the price levels of the services sector and industry,  $Y^T$  and  $Y^{NT}$  the level of output,  $L^T$  and  $L^{NT}$  denote the amount of labour used in each sector. Taking the logarithm of the above equation, we obtain the following formula:

$$p^{NT} - p^T = c + (prod^T - prod^{NT}), \quad (3)$$

where the constant  $c$  contains the logarithms of the sectoral shares.

In practice, there are several approaches to empirically estimate the inflation surplus due to the Balassa–Samuelson effect, one of which is the simple accounting framework. In this case, we assume that the surplus inflation of services compared to industrial goods is determined by the weight of services in the consumer basket, and thus the inflation surplus due to changes in productivity ( $\Delta p^{B-S} = \Delta p^{NT} - \Delta p^T$ ) is as follows (Égert 2007:7):

$$\Delta p^{B-S} = (1 - \alpha)(\Delta prod^T - \Delta prod^{NT}), \quad (4)$$

where  $(1 - \alpha)$  represents the weight of services in the consumer basket. A further condition is that any change in the productivity difference between the two sectors causes a proportional ( $\beta$ ) change in the relative prices of services as well (Égert 2007:7):

$$p^{NT} - p^T = \beta (prod^T - prod^{NT}), \quad (5)$$

However, the real essence of the simple accounting framework is that the coefficient ( $\beta$ ) is taken to be 1 according to the theoretical correlation. The estimated form of the above equations, which was used similarly to Bauer's (2015) estimate is:

$$\Delta p^{NT} - \Delta p^T = c + \beta (\Delta prod^T - \Delta prod^{NT}) + \varepsilon, \quad (6)$$

where  $c$  denotes the constant,  $\beta$  the coefficient of the difference in productivity growth and  $\varepsilon$  denotes the error term. For the estimation, we used the logarithmic differences of the variables, to which  $\Delta$  refers. We examined industrial productivity for the manufacturing sector, and services productivity for the sectors of trade,

<sup>2</sup> For further derivation, see Égert et al. (2006).

transportation, hotels and catering, telecommunications, finance, real estate and professional services. By traded inflation, we mean the inflation of industrial goods, and non-traded inflation is understood as the inflation of market services. Inflation data are adjusted for changes in the VAT rate. To estimate the effect, we used average productivity growth and inflation for the period 2001–2018.<sup>3</sup>

The updated estimation results for the B–S effect are in line with the results of *Bauer (2015)*, i.e. *the correlation between the productivity growth differential and the inflation differential is weak*. At the same time, the evolution of the explanatory power ( $R^2$  indicator) must be treated with due care in the case of including or omitting a constant term from the equation (*Table 1* and *Figure 2*). The reason for this is that in the case of omitting the constant term, we essentially should arrive at the theoretical relation, which would be supported by a coefficient of around 1. Omitting the constant from the regression, the explanatory power, i.e. the  $R^2$  indicator calculated in the traditional sense, would be 0.71, suggesting a high fit. However, this is not confirmed in *Figure 2* (see the relationship between the dashed line and the data points). In the case of a regression without a constant, the  $R^2$  indicator in the traditional sense can therefore be misleading because the conditions for its application are not met.<sup>4</sup> The problem is solved by introducing an alternative interpretation of  $R^2$  indicator ( $R^{*2}$ ): in this case the correlation between the dependent variable ( $\Delta p^{NT} - \Delta p^T$ ) and the estimated values of the dependent variable resulting from the regression ( $\Delta \hat{p}^{NT} - \Delta \hat{p}^T$ ) is squared, and thus in our case we obtain an explanatory power of 0.19 (which is also shown in *Figure 2*), which is closer to reality.

As *Bauer (2015)* points out, and as also supported by the results obtained, in practice the value of the estimated coefficient of the sectoral productivity growth differential is generally less than 1 as justified by the theoretical relation. This problem can be bridged if we calculate using the simple accounting framework as described above. However, according to *Világi (2005)*, if we supplement the classical assumptions of the B–S-theory with sticky prices and the frictions of the allocation of resources, the models predict a coefficient much smaller than the theoretical coefficient of 1.

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<sup>3</sup> Comparable consumer price index data in the traded/non-traded composition which we used are only available from 2001 for all EU countries.

<sup>4</sup> The condition for applying the  $R^2$  index in the traditional sense in the case without a constant is that the average of the dependent variable (in this case the sectoral inflation difference) is zero with the value of explanatory variable(s) being zero, i.e. the average of the error term is zero.

**Table 1**

**Estimates of the Balassa–Samuelson effect with and without a constant term**

Dependent variable: Inflation difference between sectors

R <sup>2</sup>	0.19	
	Coefficient	Standard error
Sectoral productivity growth difference	0.342*	0.148
Constant	2.406	0.375

Dependent variable: Inflation difference between sectors

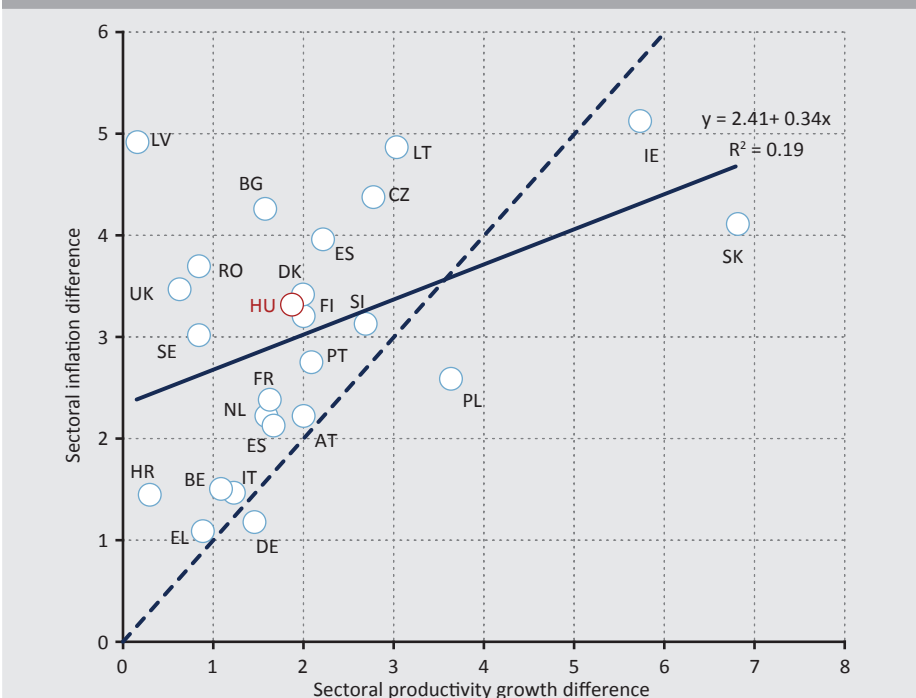
R* <sup>2</sup>	0.19	
	Coefficient	Standard error
Sectoral productivity growth difference	1.108***	0.143

Note: Excluding Cyprus and Luxembourg. \*\*\* indicates coefficients significant at the 1 per cent level, while \* indicates coefficients significant at the 10 per cent level. Estimation horizon: 2001–2018. In the case without a constant, an alternative definition of R<sup>2</sup> was used.

Source: Eurostat, estimate of the Magyar Nemzeti Bank (MNB)

**Figure 2**

**Inflation differences between services and industrial goods relative to sectoral productivity growth differences in the industrial and services sectors**



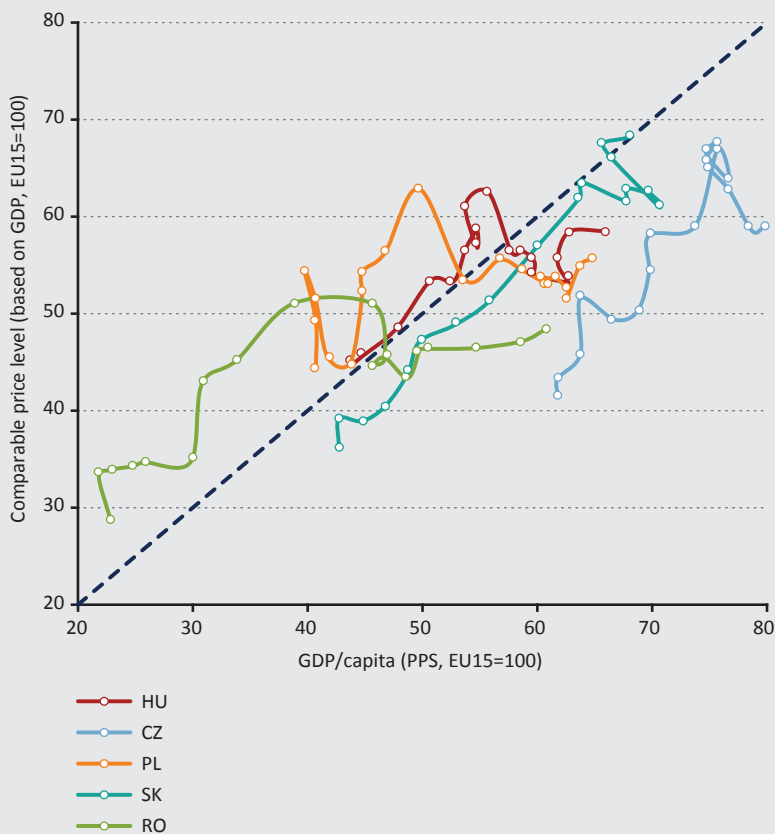
Note: Excluding Cyprus and Luxembourg. (2001–2018, annual growth differences in percentages).

Source: Eurostat, MNB



We also examined the development of price level convergence over the last nearly two decades in Hungary and in the other countries of the region (Figure 3). In line with economic convergence, we observed an increase in the relative price level up until the outbreak of the economic and financial crisis: after 2009 both real economic and price convergence slowed down somewhat.

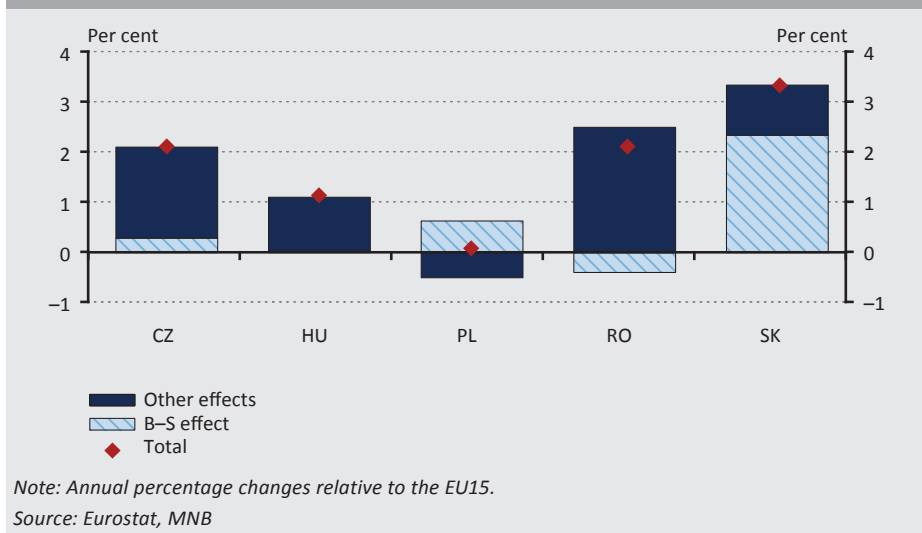
**Figure 3**  
Price convergence of Hungary and other CEE countries compared to the EU15 as a function of economic development (2001–2018)



Source: Eurostat, MNB

Similar to Bauer's (2015) calculations, the annual average price convergence of the investigated period compared to the EU15 countries was decomposed according to the role of the B–S effect and other effects (Figure 4). Overall, the results show that the development–price level relationship, although it significantly contributed to the price convergence of the regional countries, is empirically less explained by the B–S effect if we focus on Hungary and the other regional countries in our study.

**Figure 4**  
**Role of the Balassa–Samuelson effect in price convergence (2001–2018)**

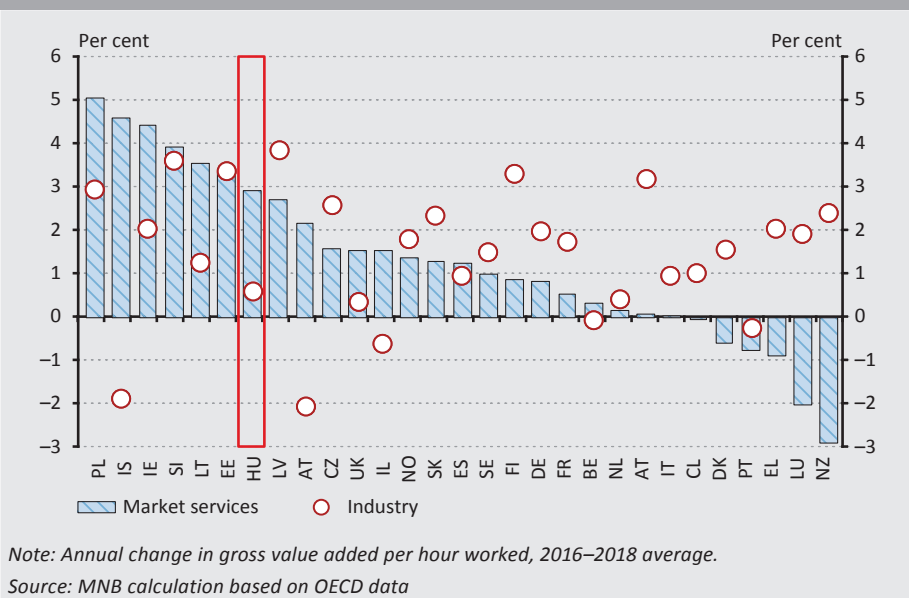


## 2.2. Evaluation of the estimation results of the Balassa–Samuelson effect

Based on the above, the estimation results, extended and updated with the data that have become available in the meantime, led to a conclusion similar to that of the previous estimates, as they only poorly supported the Balassa–Samuelson effect. The question arises as to what may be behind this. In order to answer this question, it is worth considering whether the traditional assumptions related to the theory still hold true nowadays or need to be supplemented or modified.

Over the past 50 years, the world's economies have undergone changes that have fundamentally transformed the services sector and its role, weakening the fulfilment of the necessary conditions for the Balassa–Samuelson effect. The first assumption is that the productivity of services can hardly be increased, which is no longer the case today and even more so in the future. Market services used to be characterised by historically subdued productivity growth compared to industry. However, based on data from the last few years, this may have changed, as proved also by the data: in the OECD countries, the productivity of market services has risen substantially in many countries, surpassing productivity growth in the industrial sector (*Figure 5*). Looking ahead, the new wave of innovation and the achievements of the new industrial revolution could further increase the productivity of services. In addition, if we adjust the measurement errors in the statistics on trade and value added in the services sector upwards (as will be discussed in more detail in the subsequent sections), we also conclude that the previous conclusion is no longer valid.

**Figure 5**  
Recent changes in productivity in industry and the services sector



The statement on the free movement of labour between countries is also becoming increasingly invalid, the most obvious example being the free movement of labour within the European Union. Globalisation and the structural transformation of global value chains may have fundamentally changed the characteristics of services that are needed for the B–S effect to prevail: as services are increasingly integrated into produced goods, it is becoming increasingly difficult to separate industrial goods and services. However, statements about the non-tradability of services are also worth re-evaluating. These changes and the reasons behind the changes are discussed in detail in the following sections.

*The Balassa–Samuelson effect is also clearly not confirmed by other research results in the literature.* Some studies place the B–S effect in the European Union and in the countries of the Eurozone between 0 and 2 percentage points per year, e.g. *Mihaljek – Klau (2008)*, who carried out estimates regarding this in the period between 1996 Q1 and 2008 Q1 for 11 CEE countries. *Égert (2010)*, examining the 23 member states of the EU, estimates that this effect was below 2 percentage points per year between 1998 and 2007 and was closer to 0 in most cases. However, the estimation results are surrounded by uncertainty, which stems mainly from the sectoral classification and the measure of labour productivity.<sup>5</sup>

<sup>5</sup> The measure of labour productivity is determined by the number of employees or the number of hours worked.

According to *Frensch and Schmillen (2011)*, no consensus can be found in the literature on the empirical justification of the B–S effect. The diverging results are primarily due to measurement errors, which are mainly related to the productivity measured in the tradable and non-tradable sectors, i.e. in the industrial goods and services sectors. The measurement error of productivity stems from two sources: on the one hand, total factor productivity should be used to measure sectoral productivity, the exact determination of which is uncertain. On the other hand, the literature dealing with the B–S effect defines traded and non-traded activities on an ad-hoc basis and assumes that tradability does not change over the period under investigation. In reality, however, the reduction in shipping costs allows more and more products to be traded. Measurement errors were supplemented by *Del Hoyo et al. (2017)* by adding that with the spread of global value chains, it is increasingly difficult to separate the tradable and non-tradable sectors, as services have become significantly more tradable in recent times and the results of the B–S effect are sensitive to the grouping of the two sectors.

### **3. New factors transforming the role and productivity of services**

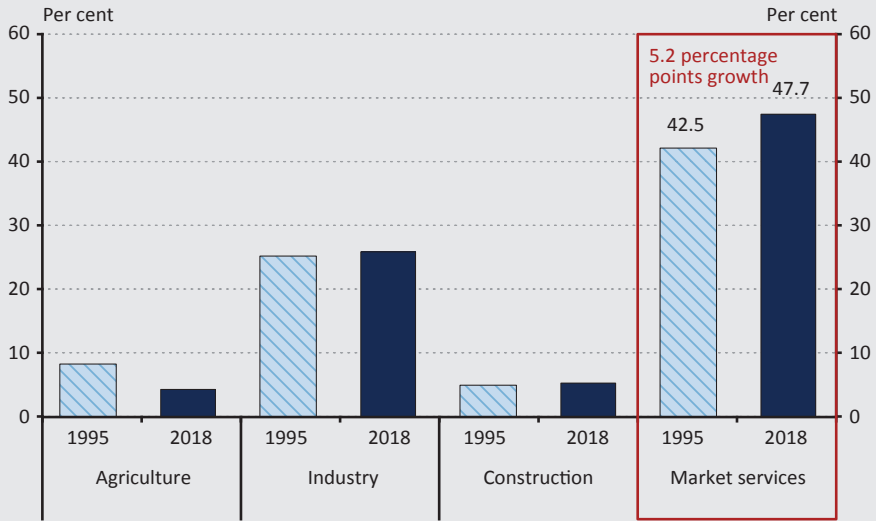
*Structural changes in modern economies, the expansion of global value chains and technological innovations make the study of the Balassa–Samuelson effect and the effectiveness of its classical assumptions harder. These are the new factors that are transforming the role of services and are also affecting the productivity of the sector. In the course of the structural transformation taking place in parallel with economic development, the role of economic sectors in growth is gradually shifting. Changes in the industrial and services sectors are particularly significant, as their separability and relative productivity provide the basis for the Balassa–Samuelson theory and justify the inflation differential between the two sectors. Of today’s megatrends, globalisation of services and digitalisation support the reduction of prices in the most affected services groups, as they enable companies to reduce their costs and to also apply this in their prices. Technological developments and the accompanying innovations can contribute to rising productivity of the services sector, which again supports the reduction of prices and thus, the narrowing of the price differential between services and industrial goods. In the latter parts of this study, we tackle these processes in a more general approach and try to answer, but at least understand, why the traditional B–S effect may have weakened by the present day. In addition, we would like to highlight topics that may be of importance in understanding economic and pricing processes. Where possible, we also present the Hungarian aspects and results.*

### **3.1. Sectoral rearrangement in the growth path of modern economies**

Changes in the structure of production and employment between sectors are also confirmed by empirical studies carried out on long time series. *Large sectoral rearrangement is basically driven by two factors: on the one hand, productivity growth in individual sectors can differ significantly (supply-side effect), and on the other hand, the income elasticity of individual products and services is also different (demand-side effect) (Gabardo et al. 2017).* Using data dating back to the 19th century from 11 developed countries, a 2013 study by Herrendorf et al. examined how sectoral employment and value added ratios changed as a function of economic development. *In the initial stage of development, the agricultural sector is dominant – it accounts for the largest share of employment – but later the share of agriculture decreases significantly. By contrast, in the case of the industrial sector, the weight of the sector shows an inverted U-shape, i.e. the share within employment rises to a certain point of development and then decreases. The economic weight of services is constantly increasing in line with development.* In addition, an accelerating growth path can be detected at the point where industry has peaked in terms of the share of added value and employment within the examined time frame. The process is commonly referred to as the great structural reallocation and, following the pioneering work of Kuznets (1966), it became an important area of research in growth theory. The main reason for the changes is that, *at a low level of development, households essentially spend their income only on agricultural products. At the level of middle-development, the share of industrial products reaches 50 per cent, and then, at higher levels of development, services, although slowly growing but with high income elasticity, take priority over industrial products in final consumption.*

We examined whether similar patterns are seen in the Hungarian economy as well. Analysing the change in the weights of domestic economic value added, we can see that *the weight of agriculture has decreased, while the weight of industry and construction remained largely unchanged* in the last two decades (Figure 6). In the case of industry, we get a slightly different picture compared to global developments, which would represent a decrease in the economic weight of the sector. Stability is explained by the reallocation between sub-sectors of industry. While mining played a substantial role within industry in the 1990s, this role declined in the 2000s as automotive production gained an increasing share. As the two processes offset each other, the weight of industry was stable at around 25 per cent. *At the same time, the strengthening of the economic role of market services sector is confirmed by the fact that an increasing share of economic value added is produced by this sector.* By 2018, the share of market services in Hungarian GDP increased by 5.2 percentage points compared to 1995.

**Figure 6**  
**Changes in the value-added weights of domestic economic sectors**

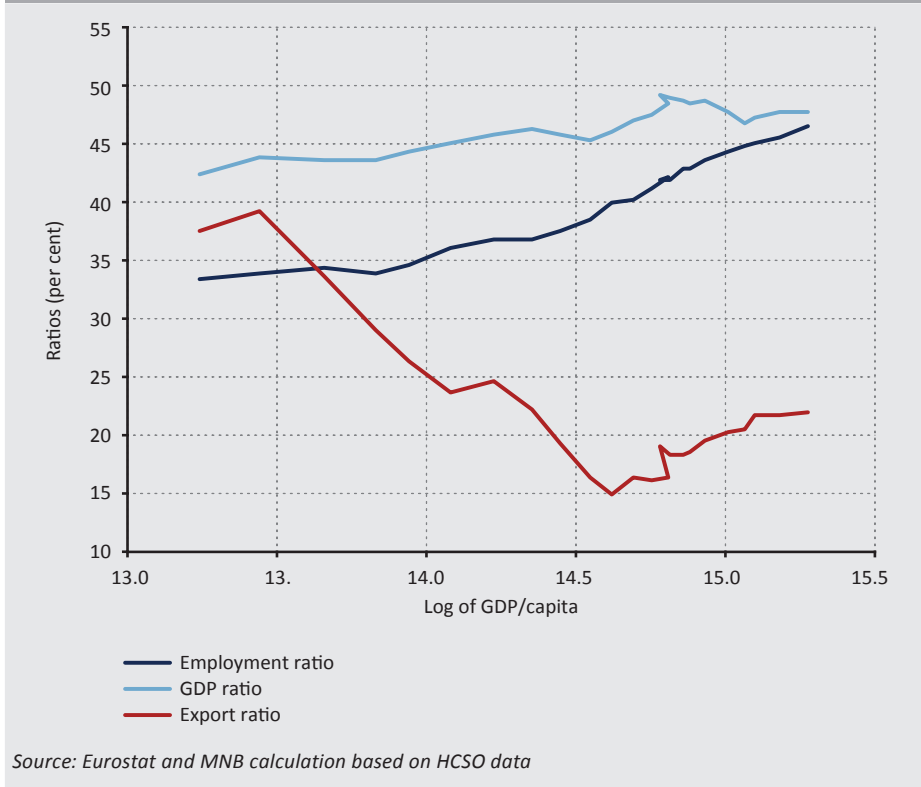


Note: Calculations based on GDP-data less taxes and subsidies.

Source: MNB calculation based on HCSO data

As the ‘winner’ of the structural transformation may be the services sector, in addition to the weight represented in the value added, we also analysed the services in relation to the various shares and development. Examining the *data of Hungary* for the period from 1995 to 2018, *the share of market-based services in employment increased year after year in parallel with development (Figure 7)*. The share of services within exports follows a similar pattern in the new growth cycle as well.

**Figure 7**  
**Different ratios of the services sector relative to economic development in Hungary (1995–2018)**



### 3.2. New technologies have a significant impact on the productivity of services

In addition to the strengthening economic role of services, it is worth mentioning the changes brought about by new technologies, which can fundamentally impact the trade and productivity of services. Compared to the Balassa–Samuelson framework, these are definitely new developments that could not previously be taken into account when applying the assumptions.

In terms of the nature of change, we can classify technologies into three main groups (McKinsey 2019).

1) *The root of technologies reducing transaction costs lies in low-cost digital communications.* In some cases, this reduces not only transaction costs but also costs associated with logistics. A clear result of the reduction in costs is the expansion of the export of services, while it tends to curb trade in goods. Examples

of such technologies are the Internet of Things, automated document processing, self-driving cars, e-commerce, cloud services or blockchain.

- 2) *Central element of technologies altering economics of production is automation and, to some extent, artificial intelligence.* These technologies (such as robotic process automation or 3D printing) can help shorten the path between the production process and the consumer, thereby increasing trade in services compared to trade in goods. However, automation may replace certain workflows and jobs. Thus, for example, the emergence of virtual assistants counteracts the expansion of services exports, as the company no longer needs to outsource this service.
- 3) The last group comprises *technologies transforming existing products.* As a result of the process, new products are created that create previously unknown opportunities in terms of trade in goods and services. Telemedicine or various streaming services are good examples of such process. Looking ahead, high-speed 5G wireless networks could revolutionise the export of services.

As a result, we may experience a major increase in the productivity of the services sector in the following period, which contradicts assumption 1 of the B–S effect. However, it remains true that – according to the theory – the productivity differential compared to industry may decrease, leading to a similar change in the inflation differential.

#### **4. Factors transforming the tradability of services**

The globalisation of services is an important phenomenon in the world economy, driven by new megatrends and explanatory factors: the emergence of global value chains, new technologies, digitalisation, the platform economy, the declining costs of tourism and mobility, and a shift in attitudes and the appreciation of ‘me-time’. These changes may lead to an increasing degree of interconnection of services and industry, thus making the separation of the products and services of the two sectors more difficult. As a consequence, the uncertainty of the estimates aimed at examining the Balassa–Samuelson effect may increase, as the results are sensitive to the traded – non-traded grouping, as pointed out in the international literature on the subject. In addition, we can also expect the ‘non-tradability’ of services to ‘dissolve’, which is confirmed by (adjusted) data from trade statistics and the structural transformation of global value chains.

Studies dealing with the globalisation of services have recently appeared in the literature, including a study by the OECD (*Miroudot – Cadestin 2017*) and the World Bank (*Heuser – Mattoo 2017*). The phenomenon referred to in the literature as the servicification of the manufacturing industry, as defined by *Miroudot and*



*Cadestin (2017)*, means that *the manufacturing industry becomes increasingly dependent on services* as they are integrated into the manufacturing process as input or linked to the end product (manufactured goods). This is also confirmed by the results of *Lanz and Maurer (2015)*, who examined the share of value added of services in the export of industrial goods. According to their estimation results, the value added of services in developed countries accounts for nearly a third of industrial goods exports, while in developing countries this value is 26 per cent. *Servicification*, complemented by digitisation and the spread of new technologies, *provides an opportunity for manufacturing companies to transform and expand their traditionally used value creation processes*. This transformation is a consequence of today's typical consumer-orientation and a new generation of global value chains. In the new generation of value chains, companies aim to shorten the path between the product and the consumer in terms of time, while delivering to the consumer a product that best meets their (rapidly changing) needs. According to the results of *Lanz and Maurer (2015)*, from the beginning of production to the final use, industrial goods go through an average of 4.45 production phases, while for services this figure is only 3.66. This means that services reach consumers much faster. Experience has shown that successful companies pay close attention to after-sale services, that is, post-purchase contact, as this ensures future purchases. *Overall, new types of value chains are based much more on services than on traditional trade in goods.*

*Traditional value chains represent a series of activities and processes that enable a product to be delivered to the end user, i.e. the consumer by taking form from the level of an idea through design and implementation.* In the past, this process took place within a given company or country, but globalisation has extended the value chains as well, and today, in the case of global value chains (GVCs), the different phases of production take place geographically fragmented, in different countries. Owing to this fragmentation, there is an opportunity to share knowledge, which increases the efficiency of global value chains and also contributes to added value. Both the World Bank and the OECD emphasise that GVCs encourage companies to take advantage of the elimination of geographical and trade barriers due to globalisation by reorganising production processes in the most beneficial and efficient way possible.

*The development and dynamic expansion of global value chains was mainly observed in the early 2000s and during the crisis, and in the subsequent period, this growth rate stabilised or expanded only moderately.* According to a study published by *McKinsey* in January 2019, *there are currently five types of structural transformation taking place in global value chains:*

- 1) *The trade intensity of commodity value chains is declining:* trade intensity, defined in the study as the ratio of gross exports to gross output, has declined in all

commodity value chains in the recent period, but this does not mean that the role of globalisation is diminishing. The background of the process is that China and other developing countries are consuming an increasing share of the products they produce, thus reducing the amount that can be exported.

- 2) *Trade-based labour arbitrage is becoming less important*: today, more than 80 per cent of global trade in goods is no longer directed from a low-labour-cost country to a high-labour-cost country, reflecting the fact that this aspect has lost its former significance.
- 3) *Global value chains are moving from global to regional*: the shift towards regional value chains is most characteristic of innovation-based value chains. This is because proximity to consumers is crucial in these due to the 'just-in-time' system.
- 4) *Global value chains are becoming increasingly knowledge-intensive*.
- 5) *The role of services in GVCs is growing, its significance is, however, underestimated*.

From the point of view of our study, the last transformation impacting services (Item 5) is the most significant, and thus this is examined in more detail in *Subsection 4.1*.

#### **4.1. The increasing role of services in GVCs**

In terms of global trade, based on the available UNCTAD data,<sup>6</sup> *global trade in goods grew by 4.4 per cent between 2007 and 2017, while the growth of trade in services was almost by one and a half times more (5.7 per cent)*. We get a more varied picture if we look at the growth rate of certain service groups in more detail. The highest growth, one and a half to two times higher than that for the trade in goods, occurred in telecommunications and IT (7.8 per cent), as well as business services (6.9 per cent) and intellectual property rights (7.3 per cent). This pattern is a good reflection of today's technological advances and the spread of digitalisation.

*However, measuring services exports is challenged by a number of factors*, and thus the question arises as to whether the role of services is correctly reflected in the available trade statistics. This is justified on the one hand by the fact that services account for an increasing share of the value of traded goods, and on the other hand, that the trade in intangible assets – software, brands, intellectual property, etc. – within companies or groups of companies is distorted in the statistics. Other reasons include the value created by free digital services and the fact that the former sharp line between services and goods is becoming increasingly blurred as goods and services are today sold bundled to one another (e.g. car sharing, bike

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<sup>6</sup> The figures presented in this paragraph were calculated on the basis of the UNCTAD Stat database on international trade in goods and services. The database is available at [https://unctadstat.unctad.org/wds/ReportFolders/reportFolders.aspx?sCS\\_ChosenLang=en](https://unctadstat.unctad.org/wds/ReportFolders/reportFolders.aspx?sCS_ChosenLang=en)

sharing or parking services). This makes it more difficult to measure the value added of the services and manufacturing sectors. Currently, statistics decide on the sectoral classification of economic activities on the basis of primary activity. Bundling and services provided by manufacturing companies, which – where applicable – serve as a significant source of revenue, may cause substantial bias in statistics (MNB 2017).

*Based on 2017 data, the value added of services in global trade was USD 5.1 trillion (McKinsey 2019). However, the value added measured by statistics may be different when numerous other factors are taken into account.* As a result of servicification, the estimated value added of services embedded in trade in goods is USD 4.3 trillion, which is more than 80 per cent of the value added of global service trade. Another adjustment item is the value added from intangible assets provided to foreign subsidiaries (USD 0.8 trillion). Various software, brands, operational processes, or certain design elements represent significant value within a company or a group of companies that cannot be properly priced until they are subject to intellectual property protection. However, this does not happen in many cases. Finally, foreign trade statistics are unable to assess even the value that free cross-border digital services create for their users (USD 3.2 trillion). Overall, all items that are presumably underestimated or not even measured by statistics would represent an extra USD 8.3 trillion value added in terms of services. Thus, the adjusted value added of services (USD 13.4 trillion) would slightly exceed the value added of trade in goods (USD 13.0 trillion) in global trade.

#### **4.2. Impact of new megatrends on the tradability of services**

Although the development of GVCs plays an important role in increasing the tradability of services and the interconnectedness of industry and the services sector, the role of new megatrends must also be taken into account in this process. The platform economy, the falling costs of tourism and mobility, and the change in approach based on the appreciation of ‘me-time’ also contribute to the transformation of the ‘traditional’ perception of the characteristics of services.

In the case of the platform economy, the Internet creates a multilateral digital framework that allows participants, i.e. demand and supply, to interact with one another. The effects of the platform economy are also commonly referred to as another wave of globalisation. For example, Amazon, Google, Facebook or Alibaba operate on a platform basis. The fact that many different types of transactions can be concluded on these digital platforms and, looking ahead, the barriers to traditional economic and market operation are practically eliminated in an economy or market functioning on digital basis significantly contributes to increasing the tradability of services.

In addition to the platform economy, the expansion of the experience-based economy is also impacting the tradability of services. In the experience-based

economy, 'me-time' is appreciating and there is a greater demand for the consumption of services. In this context, tourism and related services are of paramount importance. Today, consumer habits have changed, and for the younger generations (Y, Z, and Alpha) in particular, collecting experiences is much more important than possessing objects. Substantial reductions in mobility costs also play a role in the boom in tourism, with special regard to aviation. The attractive offers of low-cost airlines now make this form of travel accessible to a wider public, thus changing the way we used to think about services some decades ago, namely, that services are less tradable than industrial goods. Thus, nowadays, anyone can travel anywhere within a reasonable budget to get a service, be it for fun or even a dental treatment.

At the same time, it should be pointed out that the different national regulations of the individual countries sometimes put obstacles in the way of a further increase in trade in services. In this regard, *Heuser and Mattoo (2017)* assigned the difficulties arising from regulation into two groups: direct regulation and differences in regulation. In the former case, the specific legal or other regulation directly impedes the cross-border expansion of services. A good example for this is the case of telecommunications, as this sector is mostly a monopolistic or a relatively closed market. Regulatory differences between the countries mainly reduce the compatibility of goods and services, while contributing to increased transaction costs. Differences in regulation explain why GVCs have not (or only slowly) developed in sectors such as education or health.

## 5. Summary and conclusions

As noted in the introduction to the study, one generally observed phenomenon is that a positive relationship can be identified between the development of economies and the price level. Analysing the countries of the European Union, empirical facts confirmed the positive link between development and comparable price levels. Based on previous results, one of the reasons for this phenomenon may be the Balassa–Samuelson effect, according to which the convergence observed in the price level is achieved through the inflation of services. In our study, based on the estimation results we can conclude that the textbook B–S effect is less and less detectable – compared to previous results – in the case of the EU countries and, in a narrower sense, of Hungary, and is thus increasingly unlikely to be able to explain the process of price convergence. In our opinion, the background of the results is that the characteristics of the services and thus the basic assumptions of the theory have changed significantly. Accordingly, we paid special attention in the study to the analysis of the changed assumptions, in particular with regard to market services, and to the exploration of the underlying reasons. We also drew attention to new factors that may provide a different explanation for the price convergence process.

The structural transformation taking place in the economies today, globalisation and the infocommunication revolution are fundamentally transforming the role, tradability and productivity of services.

Based on *growth patterns*, the weight of agriculture decreases in parallel with economic development, while the weight of industry follows an inverted U-shape. At the same time, the role of the services sector in growth is increasing in the development path of modern economies. Patterns of global transformations can also be observed in the Hungarian trends, i.e. the share of market-based services in employment increases year by year in parallel with development. The strengthening of the economic role of market services sector is shown by the fact that an increasing share of economic added value is produced by this sector. By 2018, the share of market services in the Hungarian GDP increased from 42.5 per cent to 47.7 per cent compared to 1995.

We also assessed the new factors transforming the role and productivity of services. Here, we focused primarily on the effects of new technologies, as these could not yet be taken into account by the traditional Balassa–Samuelson theoretical framework. Technological developments and the accompanying innovations essentially contribute to increasing the productivity of the services sector.

In addition to accelerating the increase in the productivity of services, *current megatrends* – such as globalisation, digitalisation, technological development and artificial intelligence – are causing changes in consumer habits and the globalisation of services, which further weakens the practical operability of the B–S effect. Following the dynamic expansion of GVCs observed in the early 2000s, a number of structural transformations are currently taking place: the trade intensity of commodity-producing value chains is declining; with the development of robotics, labour arbitrage based on trade in goods is becoming less important; at the same time, global value chains are becoming much more knowledge-intensive and the role of services in global value chains is increasing. From among these, the last change is considered as the most important for our study. Although the development of global value chains plays an important role in increasing the tradability of services and the interconnectedness of industry and the services sector, the role of new megatrends must also be taken into account in this process. The platform economy, the falling costs of tourism and mobility, and the change in approach based on the appreciation of ‘me-time’ and the experience economy are also contributing to the transformation of the ‘traditional’ perception of the characteristics of services.

Last but not least, we noted that the value added of services is underestimated in the current National Accounts systems and in the trade statistics, some of which stem from measurement problems. *Adjustment items may include the estimated value added of services embedded in trade in goods as a result of servicification,*

*the value added stemming from intangible assets provided to foreign subsidiaries, or the value created by free cross-border digital services for their users.* Overall, all items that are presumably underestimated or not even measured by statistics would represent a substantial extra USD 8.3 trillion value added in terms of services. Thus, in global trade, the adjusted value added of services (USD 13.4 trillion) would slightly exceed the value added of trade in goods (USD 13.0 trillion).

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