TANULMÁNYOK / STUDIES

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Statistical analysis of the long-run relationship between regional integration and convergence, the European Union and integration theories

Since the mid-twentieth century, the development of the world economy has been driven by integration processes in several dimensions. According to some integration theories, the intensive and free flow of goods, services, capital and labour creates conditions similar to those of domestic economic relations, ultimately leading to convergence. European Union (EU) policy makers are trying to increase convergence and reduce divergence within the framework of a predefined regional policy. The objective of this paper, on the other hand, is not to analyse the policy of reducing regional disparities, but to statistically examine the relationship between regional integration and convergence across EU Member States within the longest time frame allowed by the methodology used. In our research, we have used a novel indicator (ITLS and CEW) to measure each of these two variables.
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Introduction

Theories explaining the processes of regional integration seek to answer the question of the laws underlying the phenomena that lead to coalescence (Bóka, 2001 In: Pintér 2017, p. 342). Puchala (1972, p. 267) illustrated this with the simile in which the fairy-tale king gave the blind wise men the task of characterizing the appearance of an elephant. The wise men tried to do this by touching one of its parts, but those who touched its feet described the animal as an iron pillar, those who touched its back as a huge barrel, and those who touched its ears as a thin, flexible sheet. Needless to say, all of these wise men were right, and none of them were right at the same time.
According to Szabó (2021b, pp. 103-104), among the theories of integration based on economic foundations - if we focus on convergence - the following two dominant but opposing trends are worth highlighting:

- the *liberal school*, which argues that the intensive and free flow of goods, services, capital and labour creates conditions similar to domestic economic relations between countries participating in regional cooperation, ultimately leading to convergence (Palánkai et al., 2011, p. 137); and
- the *regular school*, according to which the assumptions of the liberal schools do not correspond to reality, since there is no perfectly free competition and free trade anywhere in the world, and according to the observed practice of free competition always favours the stronger party, which ultimately causes divergence (Losoncz, 2011, p. 9).

It is important to note that, in practice, EU policy makers seek to increase convergence and reduce divergence within the framework of a pre-defined regional policy.

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However, for a meaningful state influence on economic and social processes, statistical data, facts and other knowledge are needed, especially in terms of how much economic performance a country has in terms of specific indicators (Bod, 2020, p. 76, p. 73). Measuring economic performance is important, among other things, because some fast-growing economies often reach a medium level - typically a GDP level of around USD 10,000 per capita - from which they cannot move on and become high-income countries. This phenomenon is also referred to as the middle-income trap, the avoidance of which can be a major challenge, especially for economies that for some reason (e.g. high share of low value-added assembly plants of foreign firms, or lack of knowledge-based labour, effective use of domestic resources and innovation) cannot move up the so-called value chain from product invention to market sale (Csath, 2022, p. 31, p. 34).
Another important economic policy issue is the question of how economic performance should be compared with what we have done in the past, with our own performance, with that of the countries around us, or with that of a larger community - regional integration, such as the EU. Csath (2021, p. 18) and Matolcsy (2020, p. 14) also argue that economic policy should retain the tried and tested elements that have worked well in the past, break with approaches that have failed in the past, and recognise and benefit from international trends, taking into account domestic specificities.
Contrary to the above problem, the objective of our paper is not to analyse policies affecting the reduction of regional disparities, to statistically examine the relationship between regional integration (as independent variable) and convergence (as dependent variable) across EU Member States, within the longest time interval allowed by the methodology used. In our research, we have used a novel indicator, ITLS and CEW, to measure these two variables.

Literature review

The concept and forms of regional integration

According to Csath (2023, pp. 9-10), globalisation is generally speaking an economic, social and political phenomenon, but it is not based on regularity, it is essentially nothing more than a consciously created "product". Szabó (2021a, p. 22) uses a similar conceptual framework to define regional integration, arguing that it is nothing other than a structure of global integration that is geographically defined, transnational, voluntarily created, economic and other dimensions, made possible by technological - primarily information technology - progress.
The forms of regional integration, which basically differ in the degree of the so-called four freedoms (goods, services, capital, labour), were first put together in a unified model by Béla Balassa in his book "The Theory of Economic Integration" published in 1961 (Balassa, 1961, p. 2). In practice, many transitional and mixed formations may emerge. The development of the EU and other regional integrations has not exactly followed Balassa's model (Simai, 2003, p. 56).
Regional integration in all its forms - as a free trade agreement - can also be understood as part of a larger structure, the international trade policy regime (Palánkai et al., 2011, pp. 157-160).
The evolutionary development of the international trade policy regime, which also encompasses the stages of regional integration - Balassa (1961, p. 2), Benczes (2011, pp. 174-175), Constantinovits (2014, 2.1), Esze et al. (2009, pp. 19-20), Kutasi (2011, pp. 201-203), Mészáros (2007, p. 251), Palánkai (2002, p. 357), Palánkai et al. (2011, pp 157-160), Simai (2003, p. 56), Tóth ed. (2010, 7.6.3) - Szabó (2021a, p. 62, p. 91) summarizes in Table 1.

Table 1: The evolution of the international trade policy regime, including the stages of regional integration, as a function of the liberalisation of the "four freedoms"

Stepping stones (ITLS)	International trade policy regime	Regional integration	Liberalised freedoms
0.	Discriminatory system	-	-
1.	Equal treatment	-	Application of a single tariff to the states concerned
2.	Preferential trade	-	Unilateral tariff preferences granted in addition to equal treatment
	Free Trade Agreement	Preferential zone	Reducing customs duties between countries
3.		Free trade area	Abolition of customs duties between Member States
4.		Customs union	Application of uniform duties against a third country
5.		Common market	Liberalisation of further freedoms (capital, labour) across borders
6.		Single market	Removal of non-tariff barriers
7.		Economic Union	Harmonisation of national economic policies
8.		Monetary union	Exchange rate stability and the introduction of a single currency
9.		Political union	Further harmonisation of policies and the creation of supranational authorities
10.	Universal free trade (theoretical category)		Global General Trade

Source: Szabó (2021a, 62, 91)

As can be seen, the two extremes of the integration steps identified in Table 1 are the discriminatory system (step 0) and universal free trade (step 10). Both concepts are more theoretical than practical. Discrimination was a feature of the relationship between the Soviet Union (and other former socialist states) and capitalist countries, and today, with the exception of the few most isolated states of the world economy, it is typically applied on an ad hoc basis, driven by economic-political objectives. Universal free trade, on the other hand, is not yet a reality, and is unlikely to become one in the near future, given the lack of a so-called 'global identity'.

Equality of treatment (Step 1) became a general principle of world trade under the General Agreement on Tariffs and Trade, and was reaffirmed in the 1974 UN Charter of Economic Rights and Duties of States. However, it is easy to see that, from time to time, economic difficulties may make it impossible to ensure equal treatment, and that unilateral preferential trade (Step 2) may also be justified for less developed countries (WTO, 2025).

Alongside equal treatment and preferential trade, the emergence of free trade agreements became a feature of the second half of the 20th century. Today, their number is estimated at 150-200. With a few exceptions, all countries in the world are involved in some level of regional integration, and some even more than others (Halmai, 2020, p. 21).

Classifying regional cooperation in the current sense, which is voluntary, is not a simple task, since, as discussed earlier, it does not develop in exactly the same stages as those described in Table 1. The regional integrations of today and of the past are classified from stage 2 to stage 8. With the exception of the historically federal countries, no political union has yet been achieved (stage 9), and there is no realistic prospect of this in the case of the EU, which is at the highest level of integration. The main reasons for this are the lack of common European traditions, identity and language; the diversity of economic and social expectations; and the large number of potential member.
In the following, alongside the EU's integration development, we consider it important to highlight the Southern African Customs Union (SACU), given that it was used as a control country group to test the reliability of our research results.

The integration evolution of SACU

It was founded in 1969 by the Republic of South Africa, Botswana, and two other small countries within the borders of South Africa, Lesotho and Swaziland. In 1990, Namibia, another state that had seceded from the Republic of South Africa, joined the community. Its integration objective was to create a customs union between the countries that had become independent during decolonisation. In fact, the initial (then involuntary) form of the customs union already existed in the colonial era, with roots going back to 1889. The SACU now also functions as a quasi-currency union, since the currency of the Republic of South Africa, the South African rand (with the exception of Botswana), is the common currency between the SACU countries, without the establishment of a central bank and without fixing national currencies, while maintaining national currencies, on the basis of bilateral agreements. It is also important to note that the SACU economy is clearly dominated by the Republic of South Africa, which has a developed economy. For the Republic of South Africa, the other member states of the community - Botswana, Lesotho, Namibia and Swaziland - are important sources of raw materials and labour. In return, South Africa provides a market and a capital base SACU, 2025).

EU integration developments

Of all regional integrations, the EU is currently the most dominant, model community.
As it is well known, the "six" - France, Germany, Italy and the Benelux countries - began closer economic cooperation between the member states within the framework of the community created by the Treaty of Rome, signed on *25 March 1957, and* known today as the EU *The customs union* and *common market* set out in the objective were achieved virtually in parallel by *1 July 1968.* The crises of the early 1970s, however, highlighted the shortcomings of integration, as governments often sought to deal with their internal difficulties by non-tariff means at the expense of their integration partners. To address this, the *single market was* completed by *31 December 1992*, but this still posed further problems in a number of areas, mainly due to the absence of a common economic policy and a common currency. In order to remedy the shortcomings of the single market, a group of Member States agreed to monetary cooperation - *Economic and Monetary* Union (EMU). Within the framework of EMU, a single currency in the form of banknotes and coins was introduced on *1 January 1999* and cash on *1 January 2002*, under the name of the euro. The EU's integration process is not yet complete, and further developments are needed, in particular to improve crisis management and resilience. However, the final form of the Community, the level of integration, which is accepted by all, has not yet emerged.
The community of six was joined in 1973 by Denmark, the United Kingdom and Ireland; in 1981 by Greece; in 1986 by Portugal and Spain; in 1995 by Austria, Finland and Sweden; in 2004 by Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia and Slovenia; in 2007 by Bulgaria and Romania; and finally in 2013 by Croatia. The United Kingdom left in 2020 (brexit).

The EMU was founded in 1999 by Austria, Benelux, Finland, France, Germany, Ireland, Italy, Portugal, Spain and Portugal; joined by Greece in 2001; Slovenia in 2007; Cyprus and Malta in 2008; Slovakia in 2009; Estonia in 2011; Latvia in 2014; Lithuania in 2015; and finally Croatia in 2023.

The EU's drive for convergence

As discussed above, while the market automatisms assumed by liberal integration theory lead to convergence, the regularist school of thought believes that these self-operating processes do not work properly in reality, ultimately causing divergence. However, EU policy makers are trying to increase convergence and reduce divergence within the framework of a predefined regional policy. The Treaty of Rome, which established the Community, already mentions the importance of reducing regional disparities, but the common level of development of the six founding Member States meant that this was of marginal importance. In 1972, however, in preparation for the enlargement of the Community, the Member States decided to establish a common regional policy combined with financial support (Kaszalik, 2023, p. 126). The primary objective of the policy, which was institutionalised in 1988, was to create economic and social cohesion and ensure convergence. After the turn of the millennium, in order to achieve the goals of the Lisbon Strategy and the Europe 2020 Strategy, cohesion policy also prioritised the increase of competitiveness, and, based on the experience of the 2004 enlargement of Central and Eastern Europe, territorial cohesion - both economic and social aspects - also became important. Nowadays, in response to the new global challenges of our time, the set of objectives has been complemented by additional areas of intervention, such as combating climate change, promoting digitalisation or managing migration, which pose additional adaptation challenges and questions for policy mechanisms (Kiss, 2021, p. 8).

Measuring convergence

The literature on measuring convergence has become very extensive, with sources such as. Kuruczleki et al. (2017, p. 45), Hussain (2022, pp. 132-141), Szabó and Dávid (2023, pp. 35-37), Varga (2016 In: Kiss, 2021, p. 30) - distinguish between different mathematical-statistical methods based on different distributions, regression models, stochastic time series analyses and club convergence (country group analysis), some of which operate with complex variables in addition to the traditional econometric indicators.
The two basic statistical methods for measuring convergence are called sigma and beta convergence.

1. *The sigma convergence* expresses the trend of the deviation of the indicators under study from their mean, expressed as a percentage. In the case of a decreasing trend, we speak of convergence, in the case of an increasing trend, of divergence.
2. *The beta convergence* is a hypothesis test based on the assumption that developing countries grow faster than developed countries. If this assumption is true, we see catching up, otherwise we see lagging behind (Anjani & Prasetyo, 2024, pp. 1863-1864).

According to Palánkai et al. (2011, p. 99), *GDP per capita* can be used as a basic indicator for convergence analysis, although in agreement with other authors, e.g. Cheng and Ke (2023, pp. 1-14), Csath (2001, pp. 189-195), Deaton and Schreyer (2022, pp. 1-15), Feldstein (2017, pp. 145-164), Mink (2022, pp. 275-292), Ross (2019) - also draw attention to the distorting effects of GDP on the true value, which, if taken into account, may lead to the need to consider a number of other indicators (Nguyen & Paczos, 2020, p. 2, pp. 24-30; Hamilton, 2021, pp. 295-297). GDP expresses only the value of the total final consumption goods produced in a given area over a given period of time (Botos, 2013, p. 77), ignoring a number of relevant factors, among which Csath (2001, pp. 189-195) highlights the following:

- GDP counts all financial movements as activities that boost the national economy, regardless of whether they are beneficial or harmful.
- Despite the fact that the location of GDP production and consumption is usually different, this indicator takes into account the results of all activities within a given economy, whether they come from domestic or foreign-owned firms.
- No account is taken of inequalities in income distribution.
- Even with a steady increase in this indicator, the population may feel that their living standards are stagnating or deteriorating.

Economic output as measured by GDP is therefore only a slice of the wealth of national economies, i.e. *national wealth* (Dynan & Louise, 2018, p. 5; Quiros-Romero & Marshall, 2020). In a country's wealth, in addition to the economic result, *human* and *natural* wealth elements also play a decisive role, since economic wealth cannot be increased in the long term by damaging the labour force and nature, and the main driver and shaper of economic development is no other than a highly knowledgeable, motivated and, last but not least, healthy human being (Csath, 2022, pp. 26-27). It is also worth noting here that the stock of knowledge typical of advanced industrialised countries can also be interpreted as a factor of production that can be developed at very high cost (Dőry & Ponácz, 2003, pp. 155-166). Although there is no generally accepted definition of national wealth, there is broad agreement that it is not the same as GDP and consists of the three dimensions mentioned above - economic, human and natural wealth (Csath, 2023, p. 109).
In view of the above, we have also sought to shift the focus from a one-sided examination of the dispersion of GDP per capita levels to a focus on potential indicators of national wealth in the research presented in the following chapters.
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Material and method

Hypothesis

To the extent that short-term market imbalances - imperfect free competition and free trade, power imbalances - are levelled out in the long run through regional cooperation, the convergence assumed by liberal integration theory and targeted by regional policy can be measured in the long run among EU Member States.

Regional integration indicator (independent variable, x)

In our research, we used an estimation-based international trade liberalisation scale (ITLS) to measure regional integration, the values of which are defined by Szabó (2021a, 70) as follows:

1. The two endpoints of the ITLS, as shown in the first column of Table 1, are the discriminatory system (ITLS=0) and universal free trade (ITLS=10). Accordingly, the intermediate values of the scale are: equal treatment (ITLS=1), preferential trade regime/zone (ITLS=2), free trade area (ITLS=3), customs union (ITLS=4), common market (ITLS=5), single market (ITLS=6), economic union (ITLS=7), monetary union (ITLS=8), and political union (ITLS=9).
2. The ITLS value for a given free trade agreement for a given date - event - can be estimated using the above scale, taking into account the available data. For the EU, the initial ITLS was estimated at 2 in 1958 (preferential trade), 5 in 1968 (common market) and 6 in 1992 (single market). From 1999 onwards, fractional numbers (ITLS=6 and ITLS=8) became necessary, as the single market Member States entered EMU in partial and successive waves and the UK left the Community in 2020.

3. By linear interpolation of the ITLS event points, a continuous data series can be constructed, from 1958 to 2020 for the EU (Figure 1).

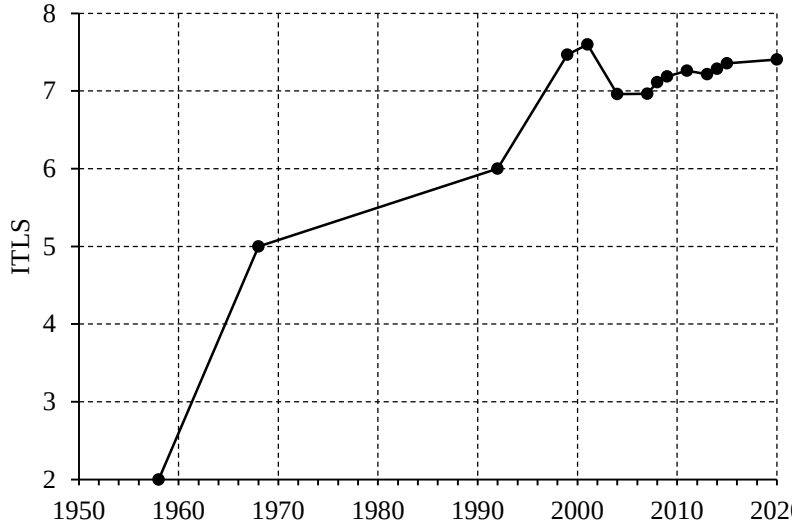

Figure 1: The evolution of EU integration, in the light of interpolated ITLS event points, from 1958 to 2020.
Source: Szabó (2021a, 92)

Convergence index (dependent variable, y)

As we have seen above, GDP per capita can be used as a basic indicator to measure convergence. GDP, however, is a one-sided and imprecise measure of economic performance, while national wealth is more than that, it includes natural and human elements. Although we do not yet know the exact indicator system for national wealth, we have used a variable proposed by Szabó (2021a, pp. 119-122), which we believe refines the measurement range of GDP, shifting the focus from unilateral measures of economic performance to national wealth. This variable is the complex economic well-being indicator (CEW), which can be formed by aggregating the following measures without weighting:

1. *GNI* as a share of GDP measures incomes received from abroad and outflows from within the country;
2. *the agricultural sector as a share of GDP*, measures the structural relationships of the sectors of the economy relative to GDP;
3. *GINI index*, a measure of income inequality;
4. *HDI index*, sub-indicators are: life expectancy index, education index, GNI.

The different measures used to construct the CEW have been normalised with relative extreme values between 0 and 1 (0 for unfavourable and 1 for favourable) to make them comparable.
Although the four basic indicators were given equal importance (25%) to avoid subjective elements, the final result is a weighted average, since the HDI index used is also composed of three additional indicators. Therefore, if the HDI index is broken down into further sub-indicators, the components of the PPSM can be refined and weighted as follows:

1. 33,33% stake: GINI;
2. 25.00% share: agricultural sector in GDP;
3. 25.00% share: GINI index;
4. 08.33% share: life expectancy index;
5. 08.33% share: education index.

We believe that the CEW takes into account economic wealth more accurately than the GDP index, since it corrects for it if income production and consumption would take place in other countries (GNI), takes into account the structural relations of the sectors of the economy (agricultural sector share in GDP), and certain human wealth elements, in particular inequality of income distribution (GINI index), and, in addition to GNI, life expectancy and education level (HDI index).

Databases used and period covered

The databases used in our research - World Bank, United Nations Development Program - contain the indicators from 1990 onwards from which the CEW can be determined. The ITLS estimate can be applied within the framework of the extreme values of the event points, i.e. 1958-2020. However, given that from 2020 onwards we may witness major global crises and geopolitical realignments beyond the scope of this study, the year 2020 has been excluded.
Based on the bottleneck of the CEW and ITLS datasets available to us as described above, our period of analysis is from 1990 to 2019.

Statistical methods used

Hypothesis testing was performed using bivariate regression analysis and correlation calculations. The strength of the relationship between the variables included in the study - ITLS (as independent variable) and CEW (as dependent variable) - was measured using a coefficient of determination (R^2).
The value of the CEW is given in the form of sigma convergence (CV), taking into account the objective of our study.
In order to smooth out the divergence jumps resulting from the accession of new Member States with different economic performances, in particular from the 2004 enlargement, a time series correction has been applied, dividing the EU's development into two sub-periods up to 2003 and from 2004 onwards. For each subperiod, we have taken into account the dependent variables of all the countries that were members of the Community in that subperiod, irrespective of their accession year (15 Member States up to 2003, 28 Member States from 2004). The curve of the two subperiods was fitted by a function transformation, which resulted in a correction of the numerical values of the variables along the axes.

Results

Hypothesis testing results

The relationship between the ITLS, an indicator of the estimated degree of regional integration, and the CEW (CV), a measure of convergence, is regression-analysed and correlation-calculated to show that the two variables are negatively linearly related over the period under study. The R^2 describing the relationship between the two variables is 0.9495, indicating a strong correlation. Considering that the relative error of the regression function exceeded 15%, the years 1990-1992, 1997-2001, 2004, and 2010 were standardized as extreme values, so that the relative error was reduced to below 15%. *Thus, if we accept the data processed and the methodology used, the results suggest that in the long run - 1990-2019 - regional cooperation between EU Member States has had a measurable - strongly deterministic effect on convergence, in line with the predictions of liberal integration theory and the objectives of regional policy* (Figure 2).

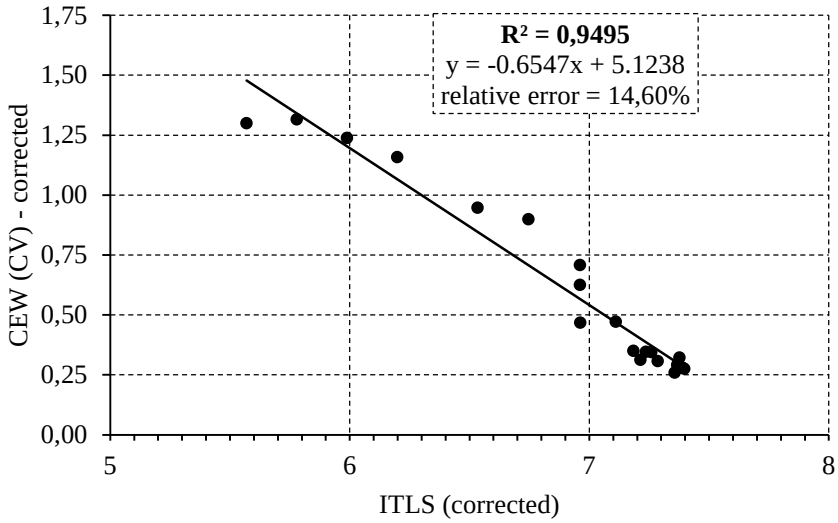

Figure 2: Relationship between ITLS and the dispersion of the CEW (CV), across EU Member States, 1990 to 2019.
Source: based on World Bank (2020, 2022), United Nations Development Program (2020, 2022), Szabó

If we also accept that the short-run market inequalities, suggested by the scatter of data points next to the regression function illustrated in Figure 2, arise from imperfect free competition and free trade and from different power relations, *our hypothesis* holds, i.e. the predictions of the convergence of the regular school in the short run and the liberal school in the long run.

Reliability assessment of CEW

In addition to the hypothesis testing, we also consider it necessary to analyse the reliability of the CEW, in particular the impact of attempts to reduce autocorrelation factors and GDP bias factors on the research results

The following steps were used to test the CEW:

1. The EU was compared to a regional integration in which the location of GDP production and consumption differs much more markedly than in the EU. Our choice was the SACU mentioned above. Indeed, the SACU economy is clearly dominated by the advanced economy of South Africa. For South Africa, the other member states of the Community - Botswana, Lesotho, Namibia and Swaziland - are important sources of raw materials and labour. In return, South Africa provides a market and a capital base.
2. Correlation calculations were performed for both regional integration using the following variables:

- Given that the ITLS estimation did not yield results for SACU due to the lack of a sufficient number of event points, the time series was used as a quasi-independent variable. By introducing a restrictive condition, we assumed that the time series and the degree of integration could be described by a positive linear relationship. As a consequence, the rules of the correlation calculus can be applied.
- As a dependent variable, GDP per capita and per year at purchasing power parity and fixed exchange rates were also examined in addition to the CEW.

The results of the correlation calculation show that for the EU there is no significant difference between convergence measured by the CEW and convergence measured by GDP. However, for

the SACU, while the CEW measures a strong divergence, GDP shows a weak convergence (Table 2).

Table 2: Convergence/divergence in PPS and GDP between EU and SACU Member States

Regional integration	Available data	R^2 CEW	R^2 GDP	R^2 difference
EU	1990-2019	0,9495 *strong convergence*	0,9501 *strong convergence*	0,0006
SACU	1990-2015	0,9198 *strong divergence*	0,4579 *weak convergence*	1,3777

Source: Maddison[4] (2003:62-65,68-69), World Bank (2020, 2022), United Nations Development Program (2020, 2022), Szabó

Thus, if we accept the data processed and the method used, the similarity in magnitude of the R^2 values for the EU leads us to conclude that the CEW did not contain significant autocorrelation factors in our hypothesis testing. This similarity in magnitude, and the significant difference in R^2 values observed for SACU, in turn, strengthens the criticisms of GDP. Sceptics argue that the bias of GDP is significant in cases where GDP is produced and consumed at different locations. This phenomenon is more pronounced among SACU Member States than in the EU economy.

Conclusions

The relationship between short-term divergence and long-term convergence

However, examining the causal link between regional policy and short-term market imbalances is beyond the scope of our study. Nevertheless, the logical conclusion *that can be* drawn from our research *is that regional policy can be an instrument that, in the long run, "bridges" the empirical experience of the regular school and the convergence theory of the liberal school.* In other words, to the extent that we accept the data processed and the methodology used, both the regular and the liberal school predictions are correct, but the former can be interpreted in the short term, the latter in the long term, and it is reasonable to assume that regional policy is an important factor in the smoothing effect between the two time periods (Figure 3).

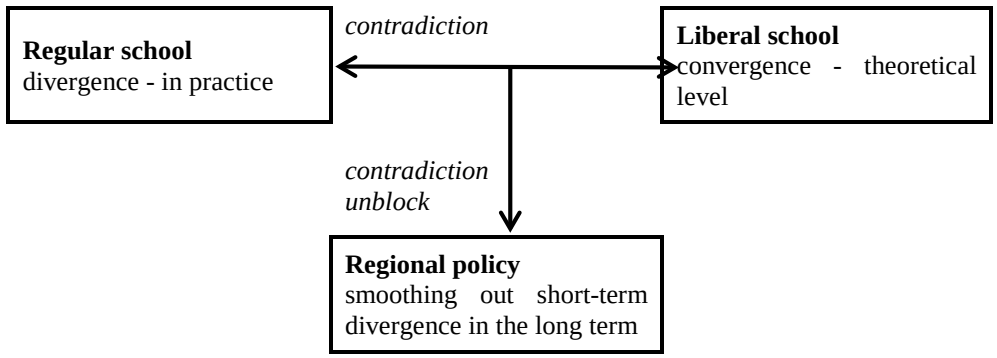

Figure 3: The link between regional policy and regional integration theories.
Source: own edited

[4] GDP for the EU1990-2003 is extracted from the statistical publication Maddisson (2003:62-65,68-69), which covers a wider time series.

Methodological boundaries

The regression analysis and correlation calculations used in the hypothesis testing were carried out with two novel variables (ITLS, CEW), as described in the material and methods section. Given that the statistical calculations with these indicators have supported the predictions of widely accepted theoretical trends, we believe that, given their methodological characteristics, they can be effectively applied to the investigation of the bivariate relationship between regional integration and convergence. In addition, we also consider it worth mentioning the main factors that limit their measurement range and suggest further research directions.
Szabó (2021a, pp. 94-95) suggests that the ITLS curve expressing the degree of regional integration is:

- It can only be used effectively in communities where several (at least two or three) ITLS event points can be identified during the integration evolution and the measurement range is narrowed down to the two extreme ITLS event points.
- It is necessarily based on an estimate with subjective elements.
- In practice, there may be transitional and mixed forms of regional cooperation in relation to the pre-defined categories of the ITLS, and in the long term there may be a need to create additional stages.
- Linear interpolation of ITLS event points can lead to estimated levels of integration that do not exist in reality (e.g. EU 1958-1968), and the trend of regional integration development is not necessarily linear.

The CEW used in the convergence analysis is believed to be:

- While it does mitigate the distorting effects of GDP - as it takes into account incomes received from abroad and income flows from the rest of the country, the structural distribution of economic sectors, and other human elements (income distribution, life expectancy, education) - it cannot be considered a national wealth indicator, it only accounts for some characteristic elements of economic wealth and human wealth, and does not measure natural wealth.
- Given that the CEW is an aggregate indicator, it can be argued that the four variables under consideration are not equally relevant when measuring the convergence effect of regional integration.
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Further research directions

The results of the hypothesis testing presented above and the novel statistical indicators used may open up a number of further research avenues, of which the following two areas are considered key to the objective of our study:

1. *Exploring the causal link between regional policy and short-term market imbalances.* A precise identification of the link could help to formulate appropriate economic policy recommendations and to prepare and implement policy measures in order to achieve long-term convergence.
2. *Review and weighting of the indicators of the CEW.* The creation of a system of indicators of national wealth could not only clarify the results of the convergence research, but could also help decision-makers to identify and forecast the emergence of a middle-income trap, and help to determine its causes, avoid the "trap", or, in the case of an already existing crisis, to leave it.

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