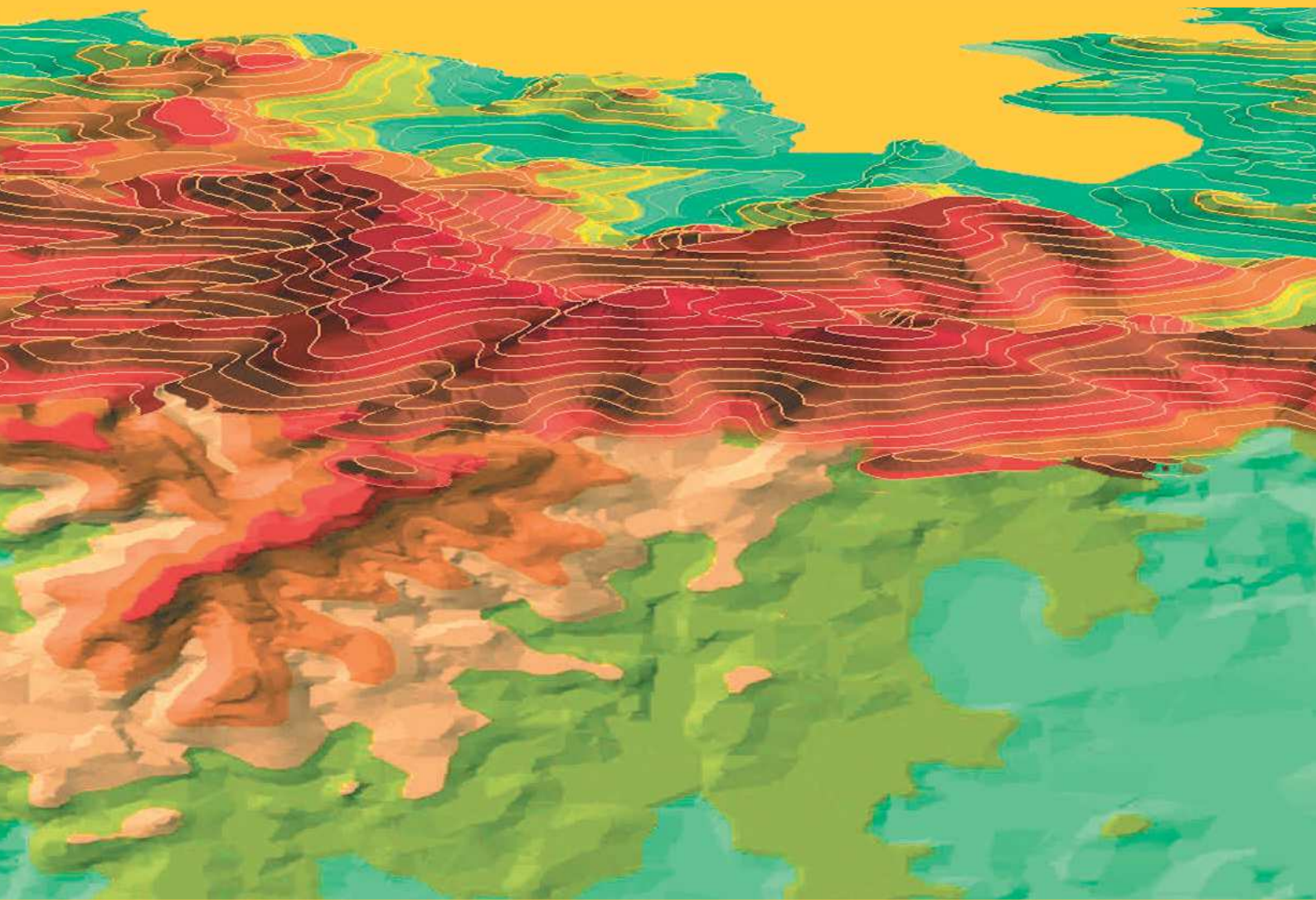


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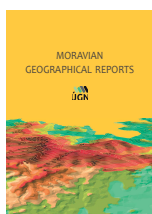
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When cultural strength means political weakness: Romania's marriage referendum and the paradox of conservative mobilisation

Alexandru RACU^a, Aurelian GIUGĂL^b, Ron JOHNSTON^{c†}, Alexandru GAVRIȘ^{d*}

Abstract

Held on 6–7 October 2018, the Romanian referendum on the topic of gay marriage was the fourth referendum of this kind organised in East Central Europe over a five-year period. Because turnout was low in all of them and demands explanation, this paper: i) discusses the common characteristics of these Eastern European marriage referendums, contextualising the Romanian referendum; ii) overviews the history of the Romanian referendum, emphasising the legal, political, ideological and societal aspects; iii) quantitatively examines the electoral geography of the voting patterns; and iv) interprets qualitative data seeking to understand the voters' choices and why conservative mobilisation was so weak.

Keywords: referendum, same-sex marriage, electoral geography, East Central Europe, Romania

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1. Introduction

In the last thirty years, the global advance of LGBT rights in the form of legalisation by states of same-sex unions and same-sex marriage (SSM) is evident. By the end of 2018, SSM had been legalised in 25 countries (in some cases only within certain sub-national jurisdictions), while same-sex unions had been legalised in 17 others. This trend highlights an impressive wave of policy convergence, 'a new social phenomenon' (Chamie and Mirkin, 2011), inspired by socio-political change and EU policies (Kollman, 2007, 2017).

In several countries, the issue of SSM has been decided through a referendum. In Ireland, a large majority of members of a non-partisan Constitutional Convention voted in favour of legalising SSM, advising the Prime Minister to hold a referendum on the issue (Elkink, Farrell, Reidy and Suiter, 2017). Elsewhere, when Parliaments have attempted to legalise gay marriage, opponents have successfully requested that it be decided by a referendum (as in Taiwan and Slovenia) or, as in the Romanian case, opponents of SSM

have successfully requested the organisation of a referendum with the specific purpose of preventing future possible legalisation of SSM, preceding any possible attempt to do so within normal Parliamentary procedures.

Romania's Marriage Referendum, held on 6–7 October, 2018, was not an isolated event, therefore. Similar referendums have been organised in Croatia (2013), Ireland (2015), Slovakia (2015), Australia (2017), Taiwan (2018), and twice in Slovenia (2012 and 2015). Moreover, between 1998 and 2015 (the year in which gay marriage became legal throughout the United States as a result of a Supreme Court decision in *Obergefell v. Hodges*, 2015), referendums on SSM involved 35 states, in four of them twice (Cahill and Cahill, 2004; Simon, Matland, Wendell and Tatalovich, 2018). Of the 39 total referendums, 34 were won by opponents of gay marriage. Supporters of gay marriage were successful in Australia and Ireland, while opponents prevailed in Slovenia, Croatia and Taiwan (for more information about Taiwan's referendum: see Hung, 2018).

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In Australia, there was no formal referendum, as the government organised instead a postal survey (McAllister and Snagovsky, 2018; Wilson, Shalley and Perales, 2019). Gay marriage was subsequently legalised by Parliamentary decision: the government had previously said that there would be no vote on the issue in Parliament should the majority of respondents in the survey be opposed to gay marriage, but would allow a free vote for MPs if there was a majority in favour. Turnout was 79.5 per cent with 61.6 per cent in favour: only four MPs did not vote for the subsequent Act implementing the plebiscite decision, after the Senate had voted 43 – 12 in favour (Gravelle and Carson, 2018; McAllister and Snagovsky, 2018). In Slovakia and Romania, although a large percentage of those who voted were against gay marriage, the referendums were invalidated due to the lack of a quorum, as turnout was less than a specified minimum.

In such a context, our paper poses an empirical question: Why did so few Romanians turn out to vote in the referendum? This question is particularly pertinent given the apparent innate conservatism in the country. For example, Romania comes second and fourth in a poll in which people were asked if (i) they believe in God, and (ii) how important religion is in their lives (Pew Research Center, 2017). This specific question is explored through analyses of the geography of voting using a mixed-method approach. In a broader perspective, analyses related to SSM have been undertaken, especially in the United States context (Chapman, 2011; Chapman, Leib and Webster, 2011; Brown, Kopp and Morrill, 2005; Webster, Chapman and Leib, 2010). These works have emphasised a paradigmatic framework focused on contemporary cultural politics and cultural conflicts (Sharp, 1996; Brown, Kopp and Morrill, 2005). As Wolfe (1999) has argued, debates over the proper place of gays in society have remained a central divide in American political culture. In post-socialist circumstances, however, such conflicts are relatively new, embedded in local contexts and politics. Informed by such particularities and within the under-explored terrain of attitudes to SSM in Eastern Europe, this paper seeks a theoretically-based answer that scrutinises particular regional issues and particular conditions – to illustrate how conservative cultural strength is translated into conservative political weakness.

2. The regional specificity of East Central European referendums

Excluding the United States, with its multiple state-level referendums, out of seven countries that organised referendums on SSM in recent years, five are European and four of which are Eastern European, suggesting that it is a region where the gay rights agenda encounters significant political resistance. Whereas most Western European countries have legalised SSM, no East Central European country has so done, and many of those countries, including Romania, do not offer any sort of legal cohabitation formula for same-sex couples.

Unlike the referendum in Ireland, all East Central European referendums on SSM have been organised as a result of pressures from below, exercised by Conservative-Christian organisations with similar ideologies and tactics. In each country, gay rights were perceived and presented by these organisations as a threat to (traditional) family values.

In all four East Central European cases, LGBT and Human Rights groups opposed referendums. In Romania and Slovakia, anticipating that it would be impossible to obtain

a majority of votes favouring SSM and recognising the legal provision that establishes a validation quorum of 30 per cent in Romania and 50 per cent in Slovakia, these same groups and their political allies opted for the strategy of boycotting the referendum (so that the quorum threshold would not be reached) – which proved successful. Such a strategy was excluded in Croatia, where there is no validation quorum, and in Slovenia, where a referendum result is validated if the majority of ballots cast for either YES or NO represents 20 per cent of registered voters (Forest, 2018; Krasovec, 2015; Kroslak, 2015; Rybar and Šovčíková, 2016; Sloodmaeckers and Sircar, 2018).

Although polls have indicated that, compared to Western Europeans, Eastern Europeans are significantly more conservative when it comes to SSM, for example with a minimum of eight per cent of Dutch and a maximum of 83 per cent of Bulgarians opposed (European Commission, 2015), this social profile is translated only partially, and in the Slovak and Romanian case insufficiently, into clear electoral outcomes favouring traditional marriage. Whereas polling data show that 63 per cent of Croatians, 46 per cent of Slovenians, 76 per cent of Slovaks, and 79 per cent of Romanians oppose SSM (European Commission, 2015), turnout in their referendums on this issue has been relatively low: 37.9 per cent in Croatia, 36.4 per cent in Slovenia, 21.4 per cent at Slovakia's second referendum, and 21.1 per cent in Romania.

These percentage differences apparently place Croatia and Slovenia, on the one hand, and Romania and Slovakia, on the other hand, in two distinct categories: the first of which is characterised by low voter turnout (around 37 per cent) and the second by very low voter turnout (around 20 per cent), reflecting the notion that the quorum threshold led to the referendum being boycotted by the progressive camp in Romania and Slovakia, but not in Croatia and Slovenia. This difference of strategy is clearly reflected in the voting results: whereas in Croatia and Slovenia 63.5 and 65.9 per cent of voters respectively who turned out voted against SSM, 91.6 per cent did so in Romania and 94.5 per cent in Slovakia's second referendum in 2015 (throughout this paper, we refer only to this second Slovakian referendum). If, however, the votes against SSM are expressed as a share of the electorate (i.e. including those who abstained), there are only small differences between the four countries: 25, 23, 20 and 19 per cent respectively for Croatian, Slovenian, Slovak and Romanian electors. This means that 59.5 per cent of all Croatian voters, 50 per cent of Slovenians, 73.5 per cent of Slovaks and 75.5 per cent of Romanians opposed to SSM apparently did not vote against it in the referendums, clearly demonstrating the weakness of conservative mobilisation against SSM these countries there.

The LGBT referendums in the East Central European countries indicated a variety of strategies contextualised by the local electoral and social conditions. From these perspectives we elaborate next the case of the Romanian marriage referendum.

3. The Romanian marriage referendum: Legal aspects, politics, society and the ideological divide

Romania's SSM referendum was initiated and promoted by *Coaliția pentru Familie* (CPF: The Pro-Family Coalition), a federation of conservative and Christian NGOs which united Orthodox, Catholics and Protestants. Margarit (2019) has detailed the evolution of LGBT rights in post-

socialist Romania and of the conflict between pro-LGBT and conservative groups. The initiative benefitted from the support of the Romanian Orthodox Church and all officially recognised religious groups in Romania (Damian, 2018). Christian parishes belonging to all denominations were instrumental in gathering the signatures necessary to initiate the process of constitutional revision. CPF's aim was to amend Article 48, Paragraph 1, of the Romanian Constitution, by replacing the existing wording – “The family is established through the freely agreed marriage between spouses” – with a new one meant to eliminate any ambiguity concerning the strictly heterosexual nature of the family: “The family is established through the freely agreed marriage between a man and a woman”.

For this purpose, an Initiative Committee was constituted in October 2015 and started the legal proceedings needed to amend the Constitution. Under Romanian law, the revision process can be initiated by citizens if they gather at least 500,000 signatures, including at least 20,000 signatures per county in at least half of the country's 42 counties (including Bucharest). Between November 2015 and May 2016, CPF gathered approximately 2,700,000 signatures, which were officially submitted to Parliament on 23 May, 2018. In Romania's post-socialist history, this was the first grassroots initiative aimed at amending the Constitution through a referendum (for how referendums in Romania are not used primarily as a means to reflect citizens' opinions on policy issues: see Gherghina, 2019).

The next step required by Romanian law is validation of the initiative by the Constitutional Court, which has to verify whether the proposed amendment respects the limits within which the Constitution can be amended, limits listed in Article 152. Of particular importance in this case was Paragraph 2 of Article 152, which states that “no revision is allowed if its result is the suppression of fundamental rights and freedoms of the citizens”. Opponents of the initiative argued that, regardless of gender and sexual orientation, the right to marry is a fundamental human right which would have been breached if the amendment was passed. Thus, 24 liberal and progressive Romanian NGOs called on the Constitutional Court to reject CPF's initiative, their plea being endorsed by four international NGOs: Amnesty International, The International Commission of Jurists, The International Lesbian, Gay, Bisexual, Trans and Intersex Association, and The European Commission on Sexual Orientation Law. At the same time, two American Conservative Christian organisations – Liberty Counsel and The Alliance Defending Freedom – urged the Court to validate it. On 20 July, 2016, the Court ruled unanimously that the proposed amendment did not contradict the provisions of Article 152, Paragraph 2 (Monitorul Oficial, 2016).

The next step in the process was approval of the amendment by Parliament. Under Romanian law, in order to be finally submitted to the decision of the electorate through a referendum, a constitutional amendment must first be approved by two-thirds of the members of the Chamber of Deputies and two-thirds of the members of the Senate, or, should this not be the case, by three-quarters of the members of both chambers sitting in a joint session. Overwhelming majorities of Deputies and Senators passed the proposed amendment on 9 May, 2017 (Chamber of Deputies) and 11 September, 2018 (Senate). The only Parliamentary party that consistently opposed the referendum – despite a few cases of internal dissent – was the centre-right Save Romania Party (USR).

In the referendum campaign, the Social Democratic Party (PSD) and Popular Movement Party (PMP) called on voters to vote YES, while the Alliance of Liberals and Democrats (ALDE), National Liberal Party (PNL) and Democratic Alliance of Hungarians in Romania (UDMR), advised them to vote according to their conscience. USR, on the other hand, urged voters to boycott the referendum, this being the official position of the country's main LGBT organisations, MOZAIQ and ACCEPT, as well as of the overwhelming majority of intellectuals and public figures supportive of the LGBT community, plus extra-parliamentary parties, such as the Romania Together Movement (MRÎ) of former Prime Minister Dacian Cioloş and the leftist Party of Democracy and Solidarity (DEMOS). Thus, the debate was not a divide between those in favour of voting for the amendment and those in favour of voting against it, but rather a divide between those in favour of a YES vote and those who chose to boycott the referendum. Anticipating, on the basis of known public opinion, that it would be impossible to reject the amendment at the ballot box, the overwhelming majority of those opposed to it opted for the “stay at home” strategy, in the hope that the referendum would be invalidated for lack of a quorum, a strategy which proved correct.

As far as public debate was concerned, while some sophisticated points of view were put forward by both conservative and progressive pundits, the ideological division can be reduced to the following positions: supporters of the amendment presented the referendum as a hallmark of democracy and sovereignty, arguing that “children are at stake!” – homosexuals will be able to adopt children and children's minds would be polluted by promiscuous sexual education and “the gender ideology”. On the contrary, opponents insisted that it is illegitimate to “vote on rights” or to “vote on love” – hence, their campaign slogan: “thou shall not vote on love!”. Opponents also argued that Romania's democracy was threatened by a fundamentalist offensive, which, sooner or later, would also lead to the banning of abortion and divorce. One campaign video even warned that, should the amendment pass, Romania would go back to the Middle Ages and opponents of the new religious ideology burned at the stake.

Further, CPF was accused of shady connections with American fundamentalist Christian organisations and with Putin's Russia: an article argued that “Putin does not need armed threats in order to sever Romania from the European Community, the Nord-Atlantic Treaty and other alliances. He only needs the Pro-Family Coalition” (Danciu, 2016). A few days before the referendum, 43 academics, public intellectuals, activists and artists signed a public appeal against the Referendum, denouncing what they viewed as an anti-European campaign based on hatred, similar to the fascist campaigns of the 1930s and the communist ones from the 1940s and 1950s. According to the signatories, the politicians who voted for the organisation of the referendum were attacking democracy itself, with the purpose of “instituting a type of authoritarian oligarchy with theocratic elements, similar to the one in Russia” (Anonymous, 2018). In return, NGOs and liberal intellectuals opposed to the amendment were labelled as “Soros instruments”, and the LGBT ideology denounced as a form of Western cultural imperialism, used by “globalist elites” and “Western corporations” in order to reduce Romania to the status of a colony.

This sort of discourse is not unrelated to that employed in other contexts by the ruling PSD. Locked in a conflict with European authorities over accusations that they (EU) seek to

reverse Romania's progress in the fight against corruption, which has also led to mass protests and violent street clashes with law enforcement agencies on the streets of Bucharest, PSD has been accused – and not always without reason – of trying to mobilise conservative and nationalist sentiment as a way to consolidate their power in opposition to the European Union. Supporting arguments (by PSD) related to concerns about the efforts of pro-European elements of Romanian civil society to curb PSD's attempts to undermine the rule of law and reverse Romania's progress in the fight against corruption. The leader of PSD, Liviu Dragnea, was sentenced (with suspension) for illegal electoral campaigning in 2016 and then, in 2018, for abuse of power. The Parliamentary opposition and civil society accused him of trying to reverse Romania's progress in the fight against corruption, and even of trying to take Romania out of the European Union, so that he and fellow party members would escape imprisonment. Thus, a key aspect of the Romanian referendum was an overlap – largely either circumstantial or explained by political opportunism – between the marriage debate and the corruption debate, the latter also having geopolitical implications as far as Romania's relations with the EU and NATO were concerned.

This overlap has been far from uniform. While television networks opposed to the ruling coalition and leaders of the anti-corruption social movement urged voters not to vote in "Dragnea's referendum", Christians opposed to PSD and supportive of the fight against corruption voted nevertheless, criticising the attempt of some to associate PSD and the referendum as illegitimate. Some even accused fellow Christians, who refused to vote due to this association, of betraying the Christian faith for the sake of ephemeral political goals (the prominent examples were Ludovic Orban and Dacian Cioloş, leaders of the opposition parties). Even some USR deputies voted in favour of organising the referendum, and one left the party because of its decision to boycott the referendum.

Finally, in the weeks prior to the referendum, false information or "fake news" (much of it distributed via online platforms such as Facebook), according to which a vote in favour of the amendment would give the ruling coalition the possibility to modify Romania's Constitution as they pleased, circulated in the Romanian public sphere, and some even argued that this was part of a disinformation campaign conducted by opponents of the amendment. Another example of "fake news" that circulated via social media in the weeks prior to the referendum was the theory that, independently of what people voted, the Constitution would be amended only if the ruling coalition so wished. In reality, the referendum was not merely consultative, as with some referendums held in post-socialist Romania, but decisional, a majority of votes in favour of the amendment, if at least 30 per cent of registered voters were present at the ballot box, leading automatically to the modification of the Constitution. To assess the extent to which this issue also had an impact on the final result, our interviews explored how many respondents opposed to SSM did not vote either because they associated (legitimately or not is a different question) the referendum with the corrupt interests of the ruling coalition, or because of sheer disinformation and a failure to understand what was actually at stake.

Taking into account the continuously downward trend of voter turnout throughout Romania's post-socialist period – at the most recent Parliamentary and European Parliament elections prior to the referendum it was below 40 per cent

(Comşa, 2015) – the 21.1 per cent turnout in the referendum (a historic low in Romania) was not really surprising. Although the YES vote was overwhelming (91.6 per cent), the 30 per cent validation threshold was not reached. Turnout was higher in rural areas (24.4 per cent), with a maximum of 96.5 per cent (a Dolj county locality), and lower in urban areas (17.5 per cent), with a maximum of 57.9 (in Dâmboviţa). Only one county (Suceava) had turnout above 30 per cent. There were also regional turnout differences: it was higher in less-developed regions like Oltenia (23.5 per cent) than in the most prosperous – 15.8 per cent in Transylvania.

This section has provided an overview of the developments that led to the organisation of the so-called marriage referendum in Romania and the public debate that preceded the referendum. In the next section we turn to an analysis using the quantitative data-sets.

4. The pattern of voting in Romania's marriage referendum

Given the above background, substantial variations within the population were anticipated in terms of whether they voted in the referendum and, if so, how. In general, support for the initiative should have been greatest among the more conservative elements of society, whereas decisions to boycott it should have been greatest among the more liberal groups, stimulated by one of the main political parties that many of them supported. Since in many countries, conservative values and attitudes are generally more prevalent in rural than in urban areas, and in those less developed economically, an urban-rural divide in support for the initiative was anticipated – although the degree to which this was reflected in the voting patterns would depend also on whether there were significant spatial variations in turnout.

4.1 Quantitative analysis

To evaluate these arguments in the absence of survey data, we use ecological data on the referendum result at the locality level: there are 3,181 such localities in the country. Varying in the number of registered voters between 96 and 1,790,385 (Bucharest), these areas had a mean of 5,746 (standard deviation: 35,879) and a median of 2,488 (interquartile range: 1,677–3,564). The localities were classified into three groups: villages, of which there were 2,861 with a mean registered electorate of 2,727 (standard deviation: 1,742); 217 cities with a mean electorate of 8,856 (standard deviation: 7,832); and 103 municipalities with a mean electorate of 83,058 (standard deviation: 35,430). Both cities and municipalities are urban localities and are defined by law; they differ by size, plus economic and administrative functions. A city is a territorial and administrative locality where non-agricultural activities prevail and which exerts an influence over the neighbouring area. Municipalities are important urban localities with an economic structure comprising mainly secondary and tertiary activities and a population, generally, of at least 40,000 inhabitants. In Romania, every county has a county capital. In 41 urban municipalities, all the bureaucratic, administrative and the more important industrial activities are located there. Villages were expected to have the more conservative populations and thus, the highest turnout rates: almost one-third of villages had turnout levels exceeding the national average of 21.1 per cent for all localities, compared to just 9 per cent for cities and 2 per cent for municipalities.

Most of those who voted were, as expected, in favour of the referendum's proposition: the percentage voting yes averaged 90.6 across the 3,181 localities (standard deviation: 4.09), with no significant differences across the three settlement types. Of more interest is the percentage of the total electorate (i.e. including abstainers) who voted yes, which averaged 23.2 (standard deviation: 11.5); on this measure, percentage support was significantly greater in the villages (mean 23.9) than in the other two categories (the mean for cities was 16.0 and for municipalities 18.1). Conservative values were stronger in the smaller settlements.

To further these analyses, regression models were formulated (using IBM SPSS software) with the following independent variables:

- Turnover per person: this is a measure of the volume of economic activity in a locality, which should be negatively related to both the turnout percentage and the percentage of the electorate voting yes – more economically developed areas should have smaller conservative populations; because the variable is highly skewed positively, it is entered in the regressions in its logarithmic form (Log base 10).
- Percentage voting for USR at the 2016 general election: because the USR recommended a boycott of the referendum, this should be negatively related to turnout levels – again, because of a heavy positive skew this variable is logarithmically transformed;
- Percentage voting for PSD at the 2016 general election: because the PSD recommended a 'yes' vote this should be positively related to the percentage who voted yes;
- Locality type: dummy variables for villages and municipalities, with cities as the comparator; more commonly called the baseline;
- Counties: initial exploratory analyses suggested that models including the above variables had both low R2 values and substantial residual values for each of the country's 42 counties, so dummy variables for these were included in the model, with the comparator being Covasna county, which had the lowest levels of both turnout and percentage of the electorate voting yes (Covasna is one of the two counties with a large Hungarian population – the other is Harghita).

The results of these regressions are reported in Table 1. For turnout, as hypothesised this was significantly lower the larger the per capita turnover in a locality, suggesting that higher levels of economic activity were associated with higher abstention rates; similarly, the greater the support for USR at the previous general election, the lower the turnout. In addition, holding those two variables constant, villages on average had higher turnout than cities and municipalities, with no significant difference between the latter two. All of the counties had significantly higher turnout levels than the comparator; the county that differed least from Covasna is Harghita, the other one with a large Hungarian population. Apart from Harghita, three groups of counties stand out: those with turnout levels greater than Covasna, but by no more than 17 points; those with much higher turnout levels than Covasna, 20 points or more; and an intermediate group (see Fig. 1, which shows the average difference in turnout between places in each county and those in Covasna, holding the other variables constant).

The 16 counties with the largest regression coefficients (over 20) have low levels of urbanisation and include the economically relatively underdeveloped counties from

Moldavia (Botoşani, Suceava), Wallachia (Buzău, Giurgiu, Teleorman) and Oltenia (Dolj, Olt, Mehedinţi), where the overall percentage obtained by PSD in these localities at the 2016 general election was the country's highest – 51.1 per cent. The group also includes Bihor and Suceava counties which contain Romania's largest Baptist and Pentecostal communities: 59,894 in Bihor and 50,852 in Suceava. Some have suggested a possible tie between turnout there and the number of members of these religious minorities (Iosip, 2018). Moreover, CPF's first meeting, where the proposed revision of the Constitution was discussed, took place in Vatra Dornei (Suceava county), and the following two meetings were in Oradea (Bihor county). Suceava is also a stronghold of Orthodox monasticism, with some of the largest and most active Orthodox monasteries in the country.

Among the counties with regression coefficients between 13 and 20 there are both underdeveloped areas such as Bacău, Călăraşi and Vrancea, but also two of the most developed counties in the country – Timiş and Cluj. In the last category, counties with coefficients below 13, there are two other counties, besides Covasna and Harghita with significant Hungarian minorities (39.3 per cent in Mureş and 34.5 per cent in Satu-Mare) but, somewhat surprisingly, also two counties from Dobruja, Tulcea and Constanţa, which are not as prosperous. PSD obtained its lowest vote share (39.7 per cent) in these six counties in 2016 – indeed a correlation between the county coefficients and the vote for PSD is positive ($r^2 = 0.25$) but not statistically significant.

Regarding the percentage of the electorate who voted yes, Table 1 shows that this was on average higher in villages than either cities or municipalities, that, as hypothesised, it increased the larger the PSD's share of votes cast in the locality in 2016, and decreased the higher the per capita average turnover – i.e. the more prosperous the locality the lower turnout there. Most of the coefficients for the individual counties were statistically larger than that for the comparator – Covasna – with an increase exceeding 20 points in one case (the percentage voting yes in localities in Harghita county was, holding the other variables constant, on average four points higher than in Covasna). Ten out of the twelve counties with regression coefficients greater than 10 are those with high turnout coefficients – Bihor and Suceava among them. Most of the counties (26) have coefficients between 0–10 (Fig. 2, which shows the difference in turnout between each county and Covasna, holding all other variables constant). This is similar to the YES vote at the county level: in 37 out of 42 counties, the percentages for YES vote are in the 90.1–94.6 interval. Even in the

	Turnout		Per Cent Voted Yes	
Constant	11.43	(2.24)	9.02	(1.95)
Village	3.07	(0.73)	3.52	(0.65)
Municipality	– 1.54	(1.19)	– 1.64	(1.07)
logTurnover	– 1.65	(0.35)	– 1.74	(0.30)
logUSR2016	– 4.02	(0.62)	–	–
PSD2016	–	–	0.20	(0.01)
County dummies	Yes		Yes	
R ²	0.35		0.40	

Tab. 1: Regression models of voting at the locality scale
Source: authors' computations

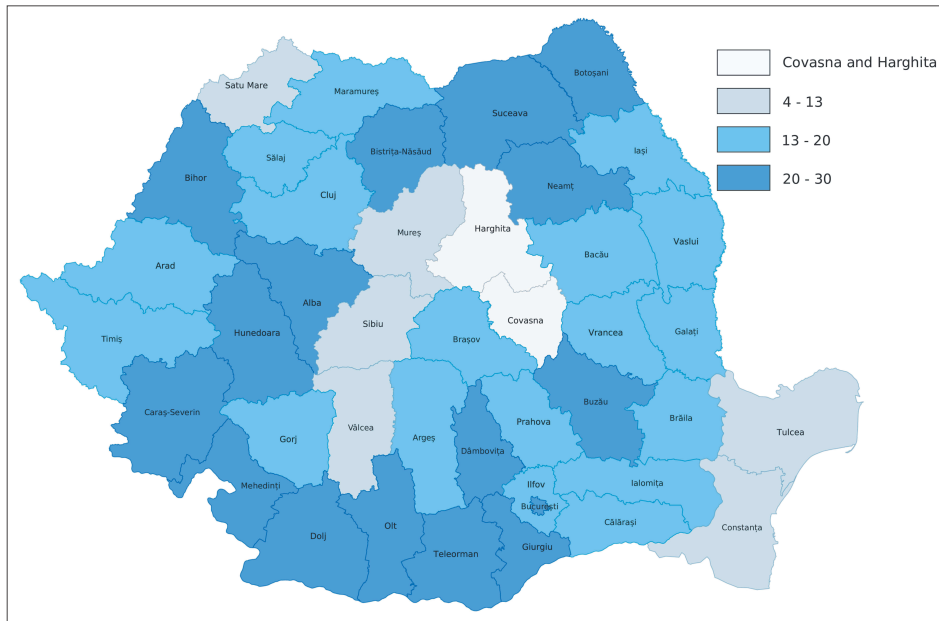


Fig. 1: Map of the coefficients for individual counties from the turnout regression in Table 1
Source: authors' computations

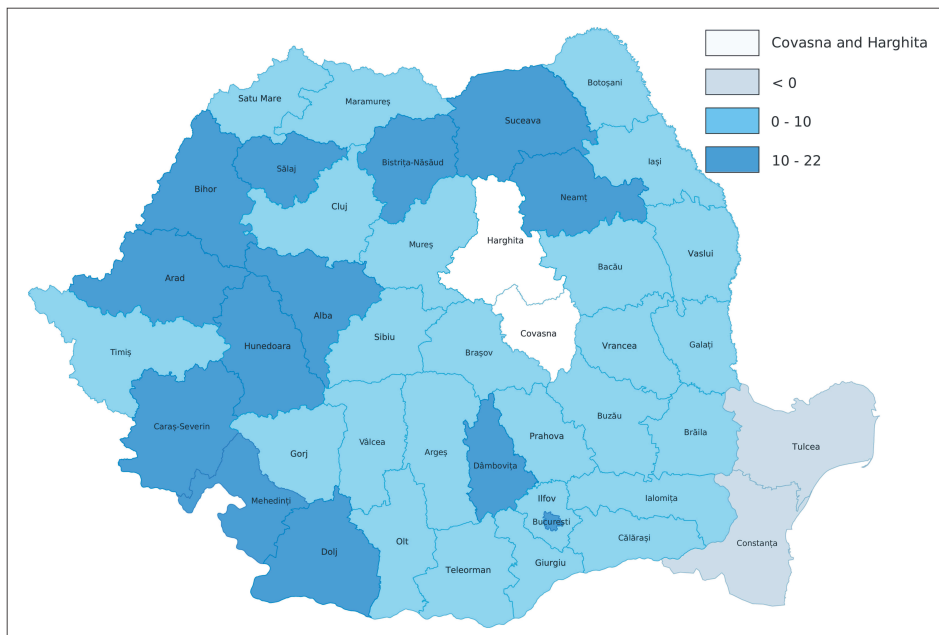


Fig. 2: Map of the coefficients for individual counties from the percent voted yes regression at the county scale
Source: authors' computations

counties with negative coefficients, Constanța and Tulcea, YES vote percentages are slightly lower than the national average, 87.4 and 88.3.

Given the significant differences across counties, a further analysis was undertaken at that scale, for which a wider range of economic variables was available. Five of these were subjected to a principal components analysis: a single component with an eigenvalue of 3.8 accounted for 76 per cent of the variance, with high loadings on all five variables (see Tab. 2).

The scores on this factor were interpreted as a measure of economic development: the higher a positive score, the more urbanised and economically prosperous the county. The intention was to include the percentages who voted USR and PSD in the analyses of turnout and voting yes, respectively,

but both – unsurprisingly – were collinear with the factor score (Score), as was the percentage of each county’s population living in villages. Thus the only other variable included was a dummy comparing the two counties where

Per Cent Employed in Agriculture	– 0.82
Per Cent Living in Urban Areas	0.81
GDP per capita	0.97
Average Salary	0.87
Average Turnover per capita	0.89

Tab. 2: Principal components factor analysis of five economic activity variables for Romanian counties
Source: authors' computations

members of the Hungarian minority are concentrated with the other 40 counties. The results were (standard errors in brackets and significant coefficients in bold):

Per Cent Turnout = 21.25 (0.60) – **2.14 Score** (0.59) – **11.89 Hungarian** (2.76); $R^2 = 0.46$;

Per Cent of the Electorate Voted Yes = 19.41 (0.57) – **1.94 Score** (0.56) – **10.86 Hungarian** (2.60); $R^2 = 0.39$.

These results confirm those obtained at the locality scale. Turnout was lower, the more urbanised and prosperous the county (where the less conservative elements of Romanian society are concentrated and USR had most support), and was especially low in the two Hungarian counties. Support for the proposal to restrict marriage to a union between a man and a woman also declined the more urbanised and prosperous the area, and was again on average even lower in the two Hungarian counties.

Having explored the quantitative pattern of voting in Romania's referendum, the following section frames the qualitative part of the methodology and explores its results. We have followed the suggestions of Brown, Knopp and Morill (2005), who have argued in favour of a mixed-methods approach which, according to them, should offer a better understanding of electoral geography. While existing studies on gay rights referendums have analysed local political contexts, public debates and electoral geographies, apart from doing this in the Romanian context, our study also adds a grassroots qualitative analysis meant to elucidate the weak mobilisation of conservative voters in Romania's marriage referendum.

4.2 Qualitative research: Design issues

The aggregate-level analyses have identified clear patterns of voting in line with the general hypotheses regarding both turnout and support for the referendum's proposition – linking both turnout levels and support for the proposition to levels of economic development and social conservatism – but they provide few insights into why the turnout levels were so low and about voting behaviours. To appreciate further why many people opposed to SSM nevertheless did not vote in the referendum, interviews were held across Romania's five main regions (Transylvania, Wallachia, Oltenia, Dobrudja and Moldavia) attempting to balance the number of interviewees to the country's characteristics: Baker and Edwards (2012) argue that 12–60 participants (in total) are advisable for such a study. After some trial interviews (November, 2019) to calibrate the questions asked and with the help of peer researchers, debriefings about what areas should be explored and what questions should be adjusted, the fieldwork commenced. Some 50 interviews were completed by using a convenience sampling approach, which aimed to interview a wide range of respondent during December, 2018 and March, 2019. The interviews, lasting between 20–40 minutes, were hand-recorded by the first and the second authors of this paper, who then coded the answers, while the second and the fourth author checked the coding processes. All the transcriptions and the initial thematic analysis were in Romanian and were followed by their translation to English. The third author, an English-speaking person, ensured that the data could be scrutinised from a variety of perspectives and indicated the exploration of various nuances. The interviewees were over 18 years and willing to express their views on the referendum: the results do not represent a representative sample of the Romanian population, therefore, but the opinions expressed provide supportive information for the aggregate analyses

of the voting patterns. Therefore, our attempt is to obtain narratives reflective of the referendum and to provide an understanding of the more general picture of the event, related to conservative non-participation.

The interviews were conducted in ten urban localities and five villages. In terms of populations, three are large municipalities (Braşov, Bucharest and Craiova), two are medium-sized municipalities (Brăila and Piteşti), two are medium-small municipalities (Bârlad and Tulcea), and three are small cities (Balş, Dăbuleni and Sinaia). There are important development differences between these places, the cities from Transylvania and Wallachia being the most developed. In rural areas, we interviewed people from five villages (located in Oltenia and Transylvania): a cluster of interviews was obtained in Oltenia to obtain the views of those with conservative views living in localities with low economic development and where PSD gained 60 per cent of the votes at the 2016 general election. One, an isolated village with a large Roma community, is distinguished by its poverty, a large proportion of the active population being on welfare. Among those interviewed were members of ethnic and confessional minorities (Roma, Hungarians); their ages ranged from 20 to 70 years and they included people who had completed primary and secondary school (22%), people who completed high-school (30%), university graduates (38%), plus some holding a post-graduate degree (10%).

The interviewees were confronted with several problems. Many respondents initially willing to discuss the matter considered it trivial. Others were frightened by the possibility of the interviewees being involved with a certain party. Another group asked why they were not interviewed before the referendum to inform them about it and what it means. Finally, the most complex problem was encountered in Transylvania, where some people asked the interviewees to leave because they did not want to hear about PSD and Dragnea.

5. Why did they vote or not... and if they did, why did they vote for or against?

Of the fifty persons interviewed (Tab. 3), 36 did not vote in the referendum: 35 were clearly against SSM; two were indifferent – they simply did not care whether homosexuals are allowed to get married or not; six were clearly in favour of SSM; and seven were in favour of SSM but without the right to adopt. These counts largely correspond to the national voter turnout, and to what polls indicated about the views of Romanians on this issue. Statistically, those in favour of SSM were younger and better educated: 40 per cent were under 35 and two-thirds had a bachelor's or a postgraduate degree. By comparison, those opposed to gay marriage were older and less educated: only 20 per cent were under 35 and only 40 per cent had a postgraduate degree. There were no significant differences between the two groups in religious practice, however: about one-fifth of both those in favour of and those opposed to SSM, attended Church services at least once a month.

While none of those either indifferent to SSM or clearly in favour of it voted in the referendum, six out of eight people in favour of SSM, but without the right to adopt children, did not vote, while the other two from this subgroup voted NO. These were the only two respondents who voted NO, and one was the only respondent out of all 50 who invoked the "fake news" concerning "Dragnea's plan" to change the Constitution in whatever way he wished, as the reason for

	Total	Vote	Did not vote	The 23 persons who were against SSM but did not vote		
				Against the ruling coalition	Regarded the referendum as a waste of resources	Mixture of explanations
Voted/did not vote	50	14	36	–	–	–
Against SSM	35	12	23	6	3	14
Indifferent	2	1	1	–	–	–
In favour of SSM	6	0	6	–	–	–
In favour but not adoption	7	1	6	–	–	–

Tab. 3: Qualitative study: Interviewees' characteristics
Source: authors' field survey accounts

voting NO. Two other respondents, who, though opposed to SSM, did not vote, invoked another type of “fake news”, saying that their vote did not matter anyway, for regardless of the result, politicians would amend the Constitution only if they so wished. Yet one of them said that, despite this belief, she would have voted YES anyway, for this is what her conscience told her to do; but in the end she did not vote because she was out of town and did not take the time to inform herself whether she could vote out of her constituency (which was indeed possible). The other person was confused: not only did she think that politicians would do as they pleased, independently of what people voted, but she also thought that the referendum was actually a trap whose real purpose was to legalise SSM, and voting in the referendum would facilitate this aim.

Overall, the findings suggest that the “fake news” circulating in the Romanian media and social media during the campaign did not have a significant influence on voters. Sheer disinformation seems to have had a more significant impact: when asked if they knew about CPF's initiative and the proposal to amend the constitutional definition of marriage, nine respondents (18 per cent) said they did not.

Only 12 (34 per cent) of the 35 people opposed to SSM voted in the referendum. The other 23 (66 per cent) abstained, which means (in this case) that more than two-thirds of respondents opposed to SSM did not vote. This clearly suggests that conservative mobilisation was very weak. When people spoke about their absenteeism, a couple of motivations stood out. Contrary to what some opposition leaders suggested, dislike of the ruling coalition did not represent the main reason for failure to participate in the vote. Among the respondents opposed to SSM (23), only six identified this as the reason for not voting. Five of them came from Transylvania, a wealthier region, traditionally supportive of the center-right parties. On the other hand, the sixth person from this group, an elderly peasant from South-West Romania spoke less about political corruption, but about the questionable morality of the ruling coalition leaders: Dragnea and Tăriceanu (Dragnea is divorced and involved in a relationship with a much younger woman, while Tăriceanu has been married five times.). In the contemporary Romanian rural world, more traditional moral perceptions are widespread. Consequently, a candidate's personal behaviour matters a great deal in the eyes of the electorate, sometimes more than the candidate's political agenda.

Several respondents (3) argued that the referendum did not make sense, as the public agenda should be about pressing socio-economic issues, not ‘bedroom issues’. For

these people, who live in a poor settlements, organising such a referendum was a needless waste of resources. These respondents stated that they did not perceive SSM as a threat to their way of life, one of them saying “I felt that by not going to vote, ‘these’ (gay people) would gain some rights. Even so, the outcome cannot change our lives, our life would remain the same... In the end, I believe that SSM would be legalised due to the enforcement by the EU.” They did not think gay marriage could be legalised in Romania any time soon, since the overwhelming majority of Romanians were firmly against it. They felt that their own culture was strong enough and had no need to be rescued by CPF.

The remaining 14 respondents who, though opposed to SSM, failed to turn out, represent the most interesting category and they were the most difficult to interview. These 14 were unable to offer a clear reason for not voting. What could be observed was a cognitive dissonance between their opposition to SSM and their behaviour on voting day. When asked whether they agreed with SSM they clearly answered that they did not. But when asked why they didn't vote against it, they offered a variety of excuses such as family duties, staying home and relaxing, going to another locality and had doubts about the possibility of voting there, alongside many day-to-day activities (Gherghina et al., in print).

One respondent from this category represented a more interesting case. A more informed and ideologically articulate conservative, he attacked Western ‘political correctness’ and said that, beyond the fact that he disliked gay parades and believed that a child should have a father and mother, he opposed SSM because he saw it as part of a contemporary trend which, in the name of equal rights, ends up by granting minorities more rights than those enjoyed by the majority. Aware of the fact that very few people from his rural settlement went to vote, he told us that ‘all his neighbours were totally against SSM, but did not vote because, though totally opposed to SSM, they are nevertheless interested in more practical issues’. He inferred that if homosexuals would appear in the community, then the whole village would have voted in the referendum.

Indeed, the common characteristic of almost all respondents who, though opposed to SSM, did not vote in the referendum – and had not, on the other hand, justified their course of action through their political opposition to the ruling coalition – was that they did not seem at all affected by the ‘fears’ (intensively) cultivated in the Romanian media and social media. They were not afraid that Dragnea's Social Democrats were about to use the referendum to advance allegedly corrupt purposes and

they were certainly not responsive to the fears cultivated by liberals and leftists regarding the perspective of a fundamentalist onslaught that would include, in the near future, the banning of abortion and divorce, in the circumstances in which there was no hint that they would agree with such measures. But neither were they responsive to the fears cultivated by CPF regarding the ‘gender ideology’ and the ‘danger’ that homosexuality represents for ‘our children’. Many people, especially in rural spaces, suggested that such an issue is typical in more developed European societies, not in their communities. They were unable to regard the issue on which they were supposed to vote, however, as something serious or, in some cases, comprehensible even. They simply inhabited a world which was disconnected from the public sphere in which a very passionate cultural war was being waged.

Many respondents considered that they did not have a reason to be afraid of gay people. Their reasoning was supported by not seeing gay people. While they heard about them, it is mainly a ‘Western thing’ and because – as they believed – there are so many gay people in the Romanian Parliament that this matter developed to such a scale to make politicians organise a referendum. It was another world that mattered to them, a world concerned with everyday life, distanced from a political debate seen as not being ‘for them’. Traditionally opposed to gay matters, they thought their collective life would not be affected, and if that would happen then they would solve it. Therefore, the debate about the referendum regarding the definition of family in the Constitution and gay rights found them in their own world, a world where life and politics moves slowly; hence, it was no reason for them to mobilise given the lack of relevance to them.

When trying to understand the low turnout, one should also take into account the weak mobilisation levels that were reported by respondents, much lower than what they were used to during electoral campaigns (Gherghina et al., in press). Respondents said that in their locality or those which they know about, only few people were actively informed by the parties or the Church. Moreover, some appeared to be ignorant about the campaign saying that they did not know about the CPF nor were they informed through any campaigning materials (Gherghina et al., in press). Combined with the unconventional topic of the SSM debate, this further contributed to the confusion of many voters who failed to understand why they were called to vote, when voting seemed so different from what they were used to. For them voting was about the distribution of power and resources and was associated with efforts made by parties to gain their vote. Now it was about an incomprehensible lifestyle with which most of them never came into contact, not even remotely, and was associated with an equally bizarre, perhaps even suspicious, indifference of local political elites with regard to voting.

Last but not least, another aspect of the low turnout related to the priests’ involvement. Respondents indicated that priests campaigned little or not at all outside of the church. The situation was even more complicated, as some of those interviewed had negative views not only of politicians but of the clergy as well, whom they regarded as worldly and greedy. One person said that the clerics lacked moral authority and consequently would be met with indifference or disdain.

Highly motivated during the campaign for gathering signatures, conservative mobilisation faded before the referendum. It failed to reach out beyond those who

already signed for the organisation of the referendum. The delay in holding the referendum and the Romanian political dynamics created a context where mobilisation was seen as being related to other topics. In this regard, more efforts were exerted by the opponents of the referendum to influence people not to vote. Political parties that officially supported the referendum made little or no effort to actually get people to vote, while the Church approached the same people who usually attended the sermons. The mobilisation efforts remained therefore in a state of suspended animation in a debate that shifted its course. Although it is unknown how such efforts might have worked out – some could claim that they were useless anyway, or even that they could have backfired – it is likely that their absence explains, at least to some extent, the failure of the referendum.

6. Concluding remarks

The conclusion of this study, which may or may not be confirmed by a broader nation-wide investigation, is that the explanation for the low turnout that led to the invalidation of the referendum, does not reside in a widespread popular adherence to the tenets of the progressive camp nor to its tactics of boycotting the referendum, even though these tactics, facilitated by the Romanian electoral law, may have proved decisive for its failure. Yet, the threshold would have been reached easily in the circumstances of a fairly active conservative mobilisation. But such mobilisation was catastrophically weak because the efforts of conservative elites – political parties that supported a YES vote, the Church, and CPF itself – to mobilise the mass of voters otherwise opposed to gay marriage, were either scarce and/or inefficient. The electoral geographical analysis shows that the turnout was higher in rural localities, in poorly-developed regions and in localities where Social Democrats are strong. Conversely, in large cities, developed regions, and where the USR performed well at the 2016 Parliamentary elections, turnout was weak.

As for the main reasons invoked by opponents of SSM for not voting, two stand out, the second being significantly more prevalent and therefore weighing more in the final result. The first reason was opposition to the ruling coalition and its leader, Dragnea, motivated especially by the respondents’ identification with the anti-corruption campaign that dominates Romanian politics. Hence, it appears that the existence of a “conflict of interests”, where support for cultural conservatism overlaps with opposition towards other political actions and the ideas of the politicians who champion cultural conservatism, undermined the mobilisation potential for undertakings such as the one initiated by CPF. The second reason is that many people, though opposed to SSM, were not “mobilised” against it. They either did not understand the stake and meaning of the referendum, or saw it as something that was rather awkward and not serious. Last but not least, though opposed to SSM, they simply were not receptive to the “fear” – cultivated by CPF and which motivated its demarche in the first place – that the LGBT movement was capable of successfully pushing for the legalisation of SSM in Romania and that, more broadly, it represented a “threat” to their way of life, and hence worth mobilising against. This perception and its subsequent political consequence are largely explained by the unchallenged strength of the conservative culture in which they live, hence pointing towards the paradox in which conservative cultural strength is translated into conservative political weakness.

Finally, given that weak conservative mobilisation in marriage referendums is not limited to Romania, but appears to be relatively general across East Central Europe, it would be interesting to replicate this analysis in other East European countries where marriage referendums were held – to see whether or not similar explanations identified in the Romanian case apply there. Beyond Eastern Europe, a comparison with the Irish referendum, where, despite the clear and resounding victory of progressives, conservative mobilisation was extremely efficient, could confirm this final intuition: where conservatism is culturally strong, it is also dormant; and being dormant, from a political point of view, it is also weak, or, in any case, not strong enough. CPF appears to have failed because of bad timing. In this sense, its attempt to wake up Romania's huge conservative majority happened too early. But one may also legitimately ask whether the paradox of conservative mobilisation described here, is not necessarily reflected in another paradox of conservative awakening: by necessity, when conservatives eventually wake up, it is already too late for them.

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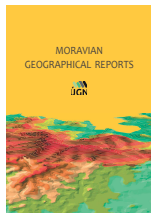
Postscripts

Ron Johnston, one of the world's most influential political geographers, is no longer with us. He died suddenly on May 29, aged 79. Ron's death was a huge shock for everyone who knows him. Right up until the end, Ron continued working and analysing, as he had done all his life. Ron never really stopped writing: he wrote and wrote. His knowledge and intellectual energy were absolutely fantastic. An influential scholar, he was also a very unselfish man. Everyone who was in contact with Ron will remember him as an exceptionally kind, formidably loyal and generous friend. I cannot put into words how important he was to me. In such a materialistic world, where many are perfectly selfish and distant, Ron was the total opposite. Simply said, Ron was a very fine man. I have no words to say how lucky I was to know and to work with as a passionate scholar as Ron. But Ron was not just a mentor, but a tender-hearted friend and a brilliant colleague. As Derek Gregory said, indeed, Big Ron, magnificent Ron!

Aurelian Giugăl, on behalf of the co-authors

Ron Johnston was one of my academic friends in the very best sense of a friend – constant, consistent, attentive, critical in all the right ways, always generous to a fault. For the profession at large, it is likely that he will be remembered primarily for his prodigious publication record: more than 1,000 articles in the peer-reviewed literature, more than 40 books and 40 edited collections, about 150 chapters in books, including very useful entries in various encyclopedias, many incisive book reviews and commentaries on ‘current trends’. But he was also a ‘doer’, as well as an accomplished writer, with several important contributions to public life, such as those to the Boundary Commission for England. His original research was primarily in Urban Geography, but over the years he worked relatively exclusively in Political Geography and in the History of the Discipline, all the while maintaining a very strong interest in the analytical (mostly quantitative) possibilities of drawing the ‘right’ conclusions. For many he will be remembered most of all for his leadership of the different collectives involved in producing the various editions of ‘The Dictionary of Human Geography’, an invaluable and extensive resource for students of the discipline of all ages, from undergraduates to retired university professors. Importantly, he never stopped learning, willing to admit changes in interpretations, as techniques for evaluating such changes emerged. For example, he eventually changed from the interpretation of contextual effects (e.g. on voting in elections) evaluated by means of econometric spatial regressions, to the more valuable multi-level modelling approaches endorsed in recent publications. Even in this current article in MGR, with his co-authors, he incorporates the values of mixed methods research designs, with greater value placed on qualitative methods than usual. He was always learning. If I may be allowed at least one brief personal story from long ago: it was in 1972 when Ron was a Visiting Associate Professor at the University of Toronto. I met him in his office there, before lunch. He was correcting the galley proofs for ‘Urban Residential Patterns’, a classic that we used in our senior undergraduate courses thereafter. After a few beers at lunch, I somehow gained enough strength – the temerity – to ask him how he could produce so many publications per year: by then, after only seven years since his first article, he had already more than fifty refereed articles in print! His reply was, as ever, simple yet profound: “Before I go to bed, every night, I must complete at least one paragraph!”. Add up the 55 years since his first publication, and you have one of likely many answers. Ron Johnston would have appreciated that, smiling.

Bryn Greer-Wooten, Editor-in-Chief, MGR



How and why did craft breweries ‘revolutionise’ the beer market? The case of Poland

Bartosz WOJTYRA^{a*}

Abstract

Since 2011, when the Pinta Brewery brewed the first AIPA-style beer in Poland, dynamic growth of the craft beer market has been observed. While there were 70 breweries in 2010, in 2019 there were already about 420, most of them small. The number of new beers on the market also increased rapidly each year in the analysed period, from around 80 in 2013 to about 2,500 in 2019. Similar changes were noted in other countries, including the USA, where it was accepted to call this phenomenon ‘the craft beer revolution’. The aim of this paper is to indicate the reasons for the emergence and development of this process, using Poland as a case study. Based on statistical data and content analyses, as well as studying the modern history of the beer market, the distribution of craft beer pubs and the names of craft breweries, this work provides evidence that the proliferation of microbreweries in Poland can be confirmed by concepts such as a resource-partitioning model, neolocalism, path dependence, and the diffusion of innovations.

Key words: craft beer revolution, craft beer market, neolocalism, path dependence, resource-partitioning model, Poland

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1. Introduction

After 1989, Poland gradually became an important player among beer producers in Europe and was among the leading countries in which this drink is the most consumed per capita (The Brewers of Europe, 2017). This was primarily the effect of the entry of large international brewing concerns into Poland in the 1990s, taking over declining smaller breweries. As a result, the beer market transformed into an oligopoly in which only three large producers played a significant role (e.g. Boratyńska, 2009; Borowska, 2009; Gołaś and Ścibek, 2010). An additional outcome was the progressive homogenisation of beer. Basically, brewing companies offered only one style of beer for distribution, classified as International Pale Lager, which shaped the tastes and palates of Polish people for many years.

An answer to the expectations of consumers seeking new flavours came in 2011, when the Pinta Brewery first brewed a beer in the style of AIPA (American India Pale Ale) in Poland. From this moment on, a dynamic growth of the craft beer segment can be observed (Wojtyra and Grudzień, 2017; Wojtyra et al. 2020). While in 2010 there were 70 breweries in the country, in 2019 there were about 420. The vast majority of these companies were small craft breweries offering strongly diversified products,

referring to the richness of beer culture. In the analysed period, the amount of new, unique beers presented annually by Polish breweries was also growing rapidly – from 82 in 2013 to about 2,500 in 2019. Similar changes were recorded earlier in other countries, including primarily the USA, where it was accepted to describe this phenomenon as the ‘craft beer revolution’ (e.g. Acitelli, 2013; Patterson and Hoalst-Pullen, 2014; Pokrivčák et al., 2019; Swinnen and Garavaglia, 2018). The development of craft brewing markets, however, was uneven in time and space (Patterson and Hoalst-Pullen, 2014). The ‘Polish beer revolution’ has some analogies to the American one, but its character is the result of local specificities and the later start.

The main aim of this research project is to examine the reasons for the dynamic changes in the craft beer market in Poland that took place after 2011, during the so-called craft beer revolution. The basic questions are: What led to the dramatic change in the craft beer market in Poland? Further, why did the craft beer revolution spread so quickly and systematically. Finally, the project tries to explain, from a theoretical point of view, what were the factors leading to the Polish craft beer revolution. On the one hand, using Poland as a case study, the phenomenon could be explained on the basis of well-established theories in the field of economics

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or socio-economic geography and scientific literature about the beer market, drawing mainly on the experience of other countries. On the other hand, an empirical exploration of this phenomenon was designed in terms of statistical data analysis, content analysis and descriptive methods. The time period for the project related to the course of the craft beer revolution, the years 2011–2019. To include an historical context, some information and analyses referring to earlier periods are presented, as a background and context for the diagnosed changes.

Since the phenomenon of craft beers has been observed in Poland for only a few years, this subject has not been examined before – up to the present research on the Polish beer market has referred primarily to the production of the largest beer companies (e.g. Boratyńska, 2009; Borowska, 2009; Gołaś and Ścibek, 2010; Huculak, 2004; Klimek, 2014; Kopec and Mitera, 2014; Łoboś and Szewczyk, 2013). Nonetheless, there are a few publications partly devoted to the craft beer market and the craft beer revolution in Poland. Such works usually relate to quantitative research in the field of management and the spatial distribution of breweries (Chlebicka et al. 2018; Łużak, 2017; Maszkowski and Wysokiński, 2017; Niemczyk, 2017; Podeszwa, 2015; Wojtyra and Grudzień, 2017; Wojtyra et al., 2020). In comparison, this article is an introduction to detailed studies on the craft beer market in Poland. In this attempt to explain the phenomenon, the basic references are to empirical publications in the field of the geography of industry, human geography, cultural geography and economics.

This paper is divided into five sections. In the next one, a theoretical background for the proliferation of the craft beer movement in the world is presented. In the third part, attention is paid to data and methods. The fourth section is focused on the characteristics of the craft beer market in Poland. The fifth part concerns the results and findings, especially some of the main reasons for the proliferation and development of the Polish craft beer market. Relevant conclusions are drawn at the end of the article.

2. Theoretical background: The proliferation of the craft beer movement in the world

2.1 Origins of the 'craft beer revolution'

The term 'craft beer revolution' originated in the USA, where it was used for the first time to describe the changes in America's craft beer market that took place in 1965 when Fritz Maytag rejuvenated the Anchor Steam Brewery. The phenomenon was also the result of home brewing legalisation by Jimmy Carter in 1979. In the United Kingdom, on the other hand, "The Campaign for Real Ale" (CAMRA) was founded. This independent voluntary consumer organisation was opposed to the growing mass production of beer and the homogenisation of the British brewing industry (see, for example: Acitelli, 2013; Elzinga et al., 2015; Hindy, 2014).

The 'craft beer revolution' is a term proposed in the literature to describe the phenomenon of a dynamic increase in the number of craft breweries and their new products, as well as the popularity of craft beer. It is a concept defining the fashion for consuming such products. The slogan 'revolution' does not concern the scale of production, but a qualitative increase in general terms. On the one hand, the qualitative change primarily concerns the extension of

brewers' offers to new beers, especially from the ale family, which are in opposition to the popular International Pale Lager. Craft breweries brew beer in almost all available 100 styles of beer (BJCP, 2015); in addition, they often introduce variations on these classic styles and also recreate historical types of beer. Therefore, the craft beer revolution is a retreat from the one style of beer as mass-produced by large concerns. On the other hand, a quantitative change is manifested in the rapid growth of new brewing entities in the groups of microbreweries, restaurant breweries, brewpubs, and contract breweries. Earlier, this form of brewing activity was not widespread. In addition, a dynamic growth of new unique brands of beers on the market is noticeable, often brewed in short series, available only temporarily, seasonally, depending on global trends, but not regularly returning to the market. In fact, the phenomenon of the craft beer revolution is evolutionary and should not be equated with the literal meaning of the term 'revolution'. This slogan was captured in the science literature from industry nomenclature and the mass media. It seems that it is currently recognisable and clearly defines the researched phenomenon. The number of publications where it is used is indicative of that (Rice, 2016).

The origin of this term can be associated with the need to emphasise the distinctness of the activities of craft breweries in relation to what was proposed by large industrial breweries. This terminology was significant from a marketing point of view and is like a stylistic hyperbola. Especially at the beginning of the craft beer revolution, the people involved in it described themselves as rebels who are looking for the possibility to choose the beer because of taste, quality, or style (Moore et al., 2016; Rao, 2008; Rice, 2016). For example, the Scottish brewery Brew Dog often invokes revolutionary slogans in their marketing campaign ("The Resistance", "Equity for Punks": Cabras and Bamforth, 2015). Currently, they are emulated by many other craft breweries, including the Polish Pinta Brewery, on whose labels we can find the slogan "Original Craft Beer Revolutionaries". Many Polish brewers emphasise their independence and willingness to create niche, experimental, interesting, unusual and high-quality products – as one example, the Golem Brewery defines its marketing strategy as "uncompromising contract brewery", and its mission statement is "Go big or go home!"¹.

The "craft beer revolution" is an international phenomenon. Poland, due in part to the development of the craft beer industry, similar to that in many other countries of the world, has become part of this revolution. In addition to the cradle of this phenomenon, i.e. in the United States, the dynamic growth in the number of breweries in recent decades has been noted in many other countries of the world, including Italy, the Netherlands, the United Kingdom, Canada, China, Japan, Australia, Denmark and Brazil. It is also visible in countries with a deeply-rooted and developed market for traditional small breweries, such as the Czech Republic, Germany, and Belgium (e.g. Cabras et al., 2016; Elzinga et al., 2015; Esposti et al., 2017; Fastigi et al., 2018; Patterson and Hoalst-Pullen, 2014; Pokrivčák et al., 2019; Swinnen and Garavaglia, 2018 – see Figs. 1A and 1B).

2.2 Resource-partitioning theory

Beer is one of the most popular beverages in the world (e.g. Arnold, 2005; Oliver, 2012; Piron and Poelmans, 2016).

¹ See <http://browargolem.pl/>

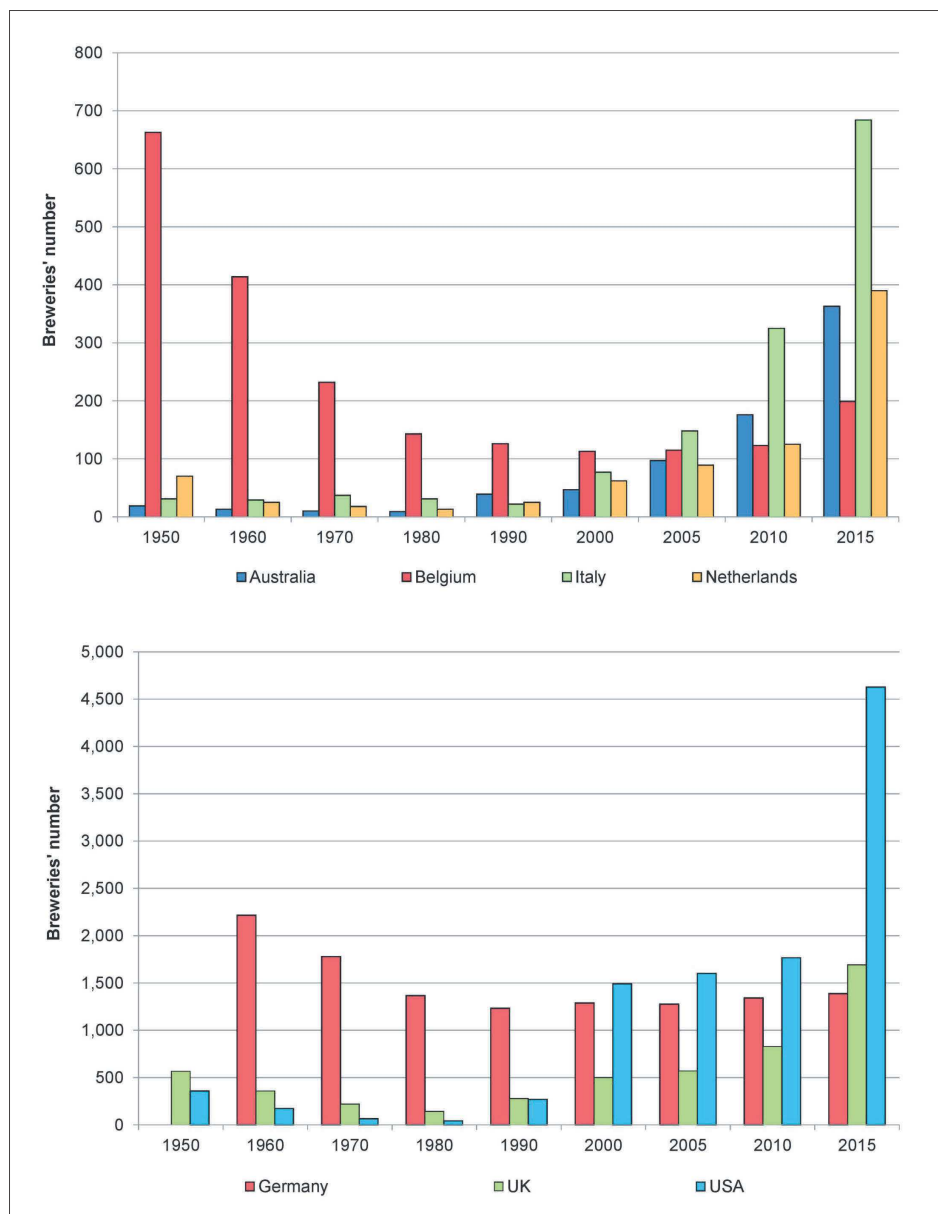
It has been known for ages and it is not “on the way out”. Over the years, beer brewing techniques and beer styles have changed, also new ingredients have been introduced, e.g. hops (Hornsey, 2003). The process of refining beer experienced its peak in the 19th and 20th centuries as a result of industrialisation. Gradually, large international brewing companies producing beer on a global scale began to dominate the market. The use of more and more advanced methods should lead to an increase in production, a decrease in the cost of producing a beer bottle, and maximising profits. Such strong competition and high entry barriers affected the consolidation of the global brewing industry and the formation of oligopolies in beer markets in many countries (e.g. Swinnen and Garavaglia, 2018). According to M. Porter (1980, p. 9): “in the brewing industry, product differentiation is coupled with economies of scale in production, marketing and distribution to create high barriers.” Thus, the changes that took place at the turn of the 21st century in many countries, including Poland, seem more surprising. A dynamic growth in the craft brewery sector appeared

somewhat contrary to the logic and classical principles of economics, because small manufacturers exerted pressure on large breweries in terms of diversity in the product portfolio. An analogous situation in other oligopolistic markets seems hard to imagine (Niemezyk, 2017).

Primarily, the craft beer revolution can be based on the resource-partitioning model, an established model of organisational ecology (Carroll, 1985; Carroll and Hannan, 1995; Carroll et al., 2002). G. Carroll and A. Swaminathan (2000, p. 717) believe that the

“resource-partitioning theory explains the rise of late-stage specialist segments within an industry as an (unexpected) outcome of the consolidation occurring among large generalist organisations as they compete for the largest consumer resource bases of the mass market”.

G. Carroll (1985) suggested first, that this model may also apply to the microbreweries market. According to resource-partitioning theory, as an industry takes on an oligopolistic structure, it often produces an increasingly



Figs. 1A, B: Changes in the number of breweries in selected countries in the years 1950–2015 (Note: different ordinate scales for these Figures)

Source: author's elaboration based on Swinnen and Garavaglia (2018)

homogeneous product which depends on economies of scale in production, marketing, and distribution to consolidate its success. This situation favours the creation of a market niche, which can be used by small producers (Freeman and Hannan, 1983; Murray and O'Neill, 2012; Cabras and Higgins, 2016; Swaminathan, 1998). On the beer market, the progressive homogenisation of beer and the popularisation of International Pale Lager on a massive scale, caused by decades of consolidation, provided a chance to open a niche market for microbreweries. R. Caves and M. E. Porter (1977) claim that this niche market existed in what had been referred to as the “competitive fringe”. In such a market niche, competition is based not only on the price level, but on competencies such as quality, innovation, and the ability to adapt to customer needs (Zuchella and Palamara, 2007). In contrast, large beer producers considered affordability to be the most important factor, particularly in low- and medium-income countries where more rapid economic growth encourages consumption (Blecher et al., 2018).

Considering the number of new, unique craft beers available on the market every year, what is very interesting is the so-called hyper-differentiation phenomenon. It is defined as an increasing importance of being truly different (Clemons et al., 2003). Hyper-differentiation leads to reducing the importance of prices as the principal factor behind customers' choice among alternative goods and services. Craft beer is a highly diversified product (Clemons et al., 2006). The team of E. G. Clemons (2006, p. 166) claim that “it may be particularly important to design a product that at least some consumers love, rather than developing a middle-of-the-road product.” This situation stands in contrast to the strategy of the larger companies whose products should provide tastes for as many consumers as possible.

According to researchers from Slovakia (Pokrivčák et al., 2019, p. 66) “motivations to drink craft beer are generated by three important factors: desire for more knowledge, new taste experience, and move away from the mainstream beer consumption.” Today, the role of consumers in the economy is changing. They are connected, better informed, and active rather than isolated and passive like several years ago (Pralhad and Ramaswamy, 2004). Consumers declare increasingly often their interest in regional products, manufactured using traditional methods, which can be associated with emphasising ethno-centric attitudes. They are curious about new flavours (Mastanjevic et al., 2019). Ecological awareness among consumers is also growing and they make purchasing decisions taking into account the environmental impact of the product. Studies have shown that consumers are willing to pay more for such products, including craft beers (Moon et al., 2002).

Consumption is often indicative of social distinction (Bourdieu, 1984). Drinks and food chosen by consumers are a form of identity expression (Blaiech et al., 2013; Dybka, 2015). The purchase of specific products personifies desires, values and aspirations. Also, drinking craft beer is an attempt to show an affinity with a group united around these types of products. Furthermore, beer can emphasise social status and prestige (craft beer drinkers as ‘beer snobs’: Toro-González et al., 2014). Baginski and Bell (2011) describe craft beer as a “high order prestige good”.

It is also significant that the Millennial generation plays an important role in craft beer popularity in the vast majority of countries (Holtkamp et al., 2016; Moore et al., 2016). They value products that reflect their generation. Millennials are among the most committed purchasers of

sustainable products and services, and they are willing to pay higher prices for environment-friendly goods (Holtkamp et al., 2016). The role of the Internet, especially social media, is also significant: it is the main medium that craft breweries use to communicate with this generation of customers (Reid et al., 2014).

2.3 Globalisation and diffusion of innovations

It seems that globalisation does have an impact on the development of the craft beer market. On the one hand, it promotes the homogenisation of food products and the creation of the same needs and preferences among consumers worldwide, which resulted in the success of International Pale Lager. The needs and palates of customers, as well as the culture of drinking beer, were unified and satisfied by standardised products supplied by brewing concerns (Stack et al., 2016). The beer market has been subject to a phenomenon sometimes described as ‘McDonaldization’ (Ritzer, 1993). This, in turn, caused the birth of the so-called ‘anti-mass production movement’ (Rao, 2008), expressing an opposition to progressive homogenisation by creating and promoting products such as craft beer, which are diverse, atypical, and high-quality. Glocalisation as counter-globalisation was also a response to the globalisation process, i.e. promotion of local traditions or specific local resources that could be offered on the global market (Robertson, 1994). One of the results of counter-globalisation is that in the last two decades the term local has taken on a new meaning (Schnell, 2013: further developed here in subsection 2.4). This has also led to support for the idea of craft breweries.

On the other hand, thanks to the development of globalisation, the world is becoming a place of fast knowledge and information transfer. Globalisation has led to the compression of time and space (Harvey, 1989). First of all, in the social sciences an increase in relationships between people is emphasised. Contact between people all over the world is direct, e.g. by traveling, and indirect, e.g. because of the development of the Internet. Globalisation has allowed the intensification of social relations that connect those living in distant places (Giddens, 1990). As a result, the flow of ideas is faster. Information sharing is more frequent and more effective. Thus, globalisation has made it possible to transfer the idea of craft beer between continents.

Transfer of information after introducing a new product on the market starts the process of the diffusion of innovations, in which the producers, buyers, and future followers take part. M. Brzeziński (2001) writes that diffusion of innovation is a process of spreading and popularising innovation in the company and the economy; occurring when it is adopted by other enterprises after the first successful application of a new technical or organisational solution. From the clients' point of view, the process of diffusion of innovation relates to the acceptance and dissemination of a given product by society (Rogers, 1962). An unquestionable advantage of craft breweries is the tendency to transfer ideas, search for innovation, introduce changes and learn. By experimenting with recipes, microbreweries are trying to achieve popularity, build a brand and at least for a moment attain a privileged position on the market.

In a fledgling market, cooperation and knowledge transfer between breweries play a significant role, especially in the case of contract breweries whose business models are based on cooperation with stationary breweries (Tomski and Menderak, 2019). Despite market competition and

acting in a market niche, unification around a common idea allows for a strengthening of the industry (Mathias et al., 2018). According to the American Brewers Association, collaboration is a hallmark of the modern craft brewing scene and is one of the strategies that allow craft breweries to compete successfully against large brewing concerns (Nilsson et al., 2018). T. Acitelli (2013) claims that collaboration was particularly valuable for the early commercial craft brewers. In addition, the cooperation of breweries helps to improve the product quality, and to gain basic strategic knowledge about the industry and its regulations (Duarte Alonso et al., 2018).

2.4 Neolocalism

Another concept that can be associated with the development of the craft beer industry and related to globalisation is so-called neolocalism. It is an answer to the progressive unification of economies and lifestyle: Schnell and Reese (2003) label it as the “smothering homogeneity of popular, national culture”. Neolocalism, then, is a return to local traditions. It consists in rebuilding and nurturing them, and it can be defined as the conscious effort of enterprises to promote a relationship with a given place. This trend is an attempt to create a “new sense of place” (Flack, 1997; Holtkamp et al., 2016). There is extensive research determining what neolocalism is and how companies, including small breweries, identify with it and engage in it (e.g. Bell, 2017; Flack, 1997; Eberts, 2014; Garavaglia, 2020; Gatrell et al., 2018; Holtkamp et al., 2016; O’Brien, 2020; Reid et al., 2014; Schnell and Reese, 2003, 2014; Yeager and Gatrel, 2020).

On the one hand, neolocalism can be said to support the emergence of the craft beer market. This is due to the growing number of people who want to re-establish connections with local communities, settings, and economies (Schnell and Reese, 2003). The lack of trust and skepticism towards large corporations is common among the Millennials, and is demonstrable in the expenses of consumers who prefer to spend money on local business and products rather than on domestic brands (Holtkamp et al., 2016). In turn, the niche was filled with craft breweries that emphasise their locality, small-scale production, and traditional brewing methods. W. Flack (1997, p. 49) argued that “microbreweries engender a strong, self-conscious attachment to their localities”, indicating that microbreweries were an expression of a new desire for roots, as well as a conscious rejection of globalised society.

The search for a sense and connection with ‘place’ is behind the strong attachment to what is local, familial. This strategy is intended to encourage people to buy beer brewed this way (Holtkamp et al., 2016). Consumers want to feel that a major part of their community by drinking beer that is clearly local or simply craft beer, which is basically brewed in a small, local brewery. They are not drinking a brand but an idea, which is often the connection to a place (Khermouch, 1995). As a result, informal groups of craft beer lovers are created. According to Nielsen’s report (2015) regarding consumer trends in the craft beer industry in the US, about half of all craft beer drinkers consider whether the beer is local when making purchasing decisions. In turn, according to the 2018 Totta Research report, craft beer lovers value locally-brewed beer, but interestingly, where the beer comes from is less important, and how the beer is produced is more important. The key for consumers is beer made from fresh, local ingredients, and available in a wide range of different types of products (DSM, 2018).

Neolocalism is manifested in the craft beer industry primarily in the simplest and most common way, i.e. through a marketing strategy that uses names, symbols referring to locality, geography, the history of the place, and its features (e.g. Bell, 2017; Eberts, 2014; Schnell and Reese, 2003). A local reference may include: the name of the brewery; the name of the beer; or a label that uses a symbol; a graphic or a photograph referring to the locality. Craft breweries present their connection with locality using dialect expressions in the name of the beer, or local ingredients in the production of the beer (Garavaglia, 2020). Besides, it may occur in the slogans and other commercial activities: e.g. in information on the official websites (Materna et al., 2019). In this way, breweries try to build customer loyalty through their attachment to place, but it is a difficult task as indicated in the Totta Research report, where it was found that craft beer drinkers like to experiment and to look for other flavours among craft beers. Therefore, they might be more often attached to the craft beer movement, *per se*, and to the locality represented by craft breweries as a part of the industry – rather than to the specific “places” that the breweries represent.

2.5 Path dependence theory

It seems that one of the justifications for the development of the craft beer industry is the theory of path dependence. P. David (1985) and B. Arthur (1989) published papers that are considered the basis for the literature on path dependence. They claim that sub-optimal or inefficient technologies may be locked in as industry standards. The concept of path dependence makes it possible to explain cases that contradict the predictions of previous theories, or those cases that were impossible to explain from that perspective.

When a product is recognised as an industry standard, and when consumers or users invest time or money in learning a particular system or in the convenience of using traditional practice, they will be less likely to try a competitive process, even if it produces better results over time.

This so-called behavioural lock-in occurs when a process, product or service “gets stuck” on a non-optimal path, when a habit or organisational culture prevents change. Because a particular food or drink is rooted in culture, it can be very difficult to change the common perception of what this product is and what it can or should be. This is also the case for beer, and more specifically for International Pale Lager (Choi and Stack, 2005; Stack et al., 2016). Only one style became synonymous with beer, although the richness of the beer world is much greater.

For large brewing corporations, changes in the production direction are very costly and would have to be supported by market needs. As a result, breaking such dominance and trapping in the path can only occur through a deep and rapid change in the system environment, known as “the turning point” (Martin, 2010). The growth of the craft beer market is based on the fact that large corporations are locked in the direction of production. The turning point in the beer market came in each country unofficially at a different moment. For example, in the Netherlands the proliferation of microbreweries was caused by the launch of the first new brewery since World War II (De Arcense Stoombierbrouwerij). In Australia, craft brewing began around 1980 and is linked with the creation of the Sail and Anchor brewery. In Spain, it started in 1989 when Jaime Tejada opened Naturbier (Swinnen and Garavaglia, 2018).

3. Data and methods

This project uses both primary and secondary data. As materials for the identification, characteristics, and evaluation of the change in the number of breweries and craft beer pubs, “The Beer Map”, created by a group of Polish “beergeeks”, known for their involvement in the craft beer scene in Poland and available on Google maps, was used. This information was verified by Internet sources (e.g. Untappd, Ratebeer, Piwna Zwrotnica, official websites, and the social media channels of breweries), press materials, and interviews with people associated with Polish breweries. The study used statistical data about GDP from World Bank resources. The Brewers of Europe and Statistics Poland reports were the bases for the analysis of production and the consumption of beer. The Birofilia report about the Millennial generation was also analysed in the context of Polish beer consumers.

The basic method used in this article is the case study report, for which the craft beer market in Poland was selected. The outcome is a detailed and comprehensive report: analysis of this report reflects the phenomenon in a holistic way, and enables the reader to draw conclusions on the causes and effects of the functioning of this particular phenomenon (e.g. Gerring, 2007; Stake, 1995). It is mainly used in descriptive research issues, especially those that focus on answering “how” and “why” questions, and results from a desire to understand complex social and economic phenomena (Yin, 2009). A special advantage of this method is that it refers to actual practice, which makes it an effective tool (Flyvbjerg, 2006) and further states that it is possible to generalise on the basis of a single, well-documented case. Thus, the method might be the basis for further testing of hypotheses and support for theoretical knowledge. A discipline without a large number of exemplars is ineffective (Kuhn, 1987).

Examining the case study, descriptive methods and content analyses were also used. The characteristics of the craft beer market began with an overview of the historical determinants of the development of the brewing industry in Poland, focusing on its modern history. The experience of other countries clearly indicates that the development of this sector is strongly associated with socio-economic and political changes that take place in a given country.

In the following section, legal conditions were analysed and the course of the beer revolution was described, indicating dynamics, milestones, and effects of this phenomenon. Using this analysis, it is possible to compare the Polish case with the history of other countries in which the revolution happened. By analysing market development, it is possible to evaluate the importance of resource-partitioning theory and path dependence, in the context of the emergence of the craft beer movement as a market niche.

Section 5 focuses on the analysis of statistical data and the evidence collected. The relationship between income and consumption of beer was supported by a linear analysis. In the context of the development of craft beer culture, a proportional symbolic map of craft beer pubs for cities was drawn. Finally, by analysing the names of Polish craft breweries, the role of neolocalism in the craft beer revolution was evaluated.

4. Profile of the case study: The craft beer market in Poland

4.1 Modern history of the Polish beer market (1918–2018)

The modern history of the Polish beer market is very turbulent and strongly reflects the political and economic

changes that took place over the period 1918–2018. The Polish brewing industry experienced years of crises and prosperity caused by two world wars, the transition to a centrally planned economy, and finally the construction of a free market economy during the political and economic transformation after 1989.

World War I covered 90% of the Polish territory and caused huge damages, especially to industry and agriculture. The provision of goods was in very poor conditions and inflation was galloping. All of these factors also affected the beer market. While in 1914 there were about 500 breweries in Poland (at that time Poland had different borders than at present), in 1919 only 280 were opened. In subsequent years, however, their number dropped very quickly. In total, 112 breweries closed in 1920–1935 (Szymański, 2018). Of course, the operational scale of these breweries was incomparable to today’s market leaders.

During World War II, many breweries disappeared. The economic reconstruction of the country after the conflict took decades, and, as a result, Poland came under the influence of the Soviet Union. Immediately after the Second World War, about 120 brewery plants were launched, but unfortunately few of them had facilities allowing production on a larger scale. During the period of the functioning of the centrally planned economy, about 100 breweries operated, but earlier all of them had been nationalised in stages. Then, the market was gradually decentralised. The stagnation of beer production occurred in the 1970s and 1980s and caused economic problems that transformed even in a political crisis in this period (Hána et al., 2020). State-owned farming kept Polish brewing away from the world, as well as from real competition forcing the improvement of production organisation and care for quality (Szymański, 2018).

After the collapse of socialism in 1989, the Polish brewing industry found itself part of strong global trends which resulted in the spectacular takeovers, the creation of large brewing groups, and changes in the production volume and supply. Since the economic transformation in the early 1990s, the beer sector in Poland has experienced the highest dynamics of beer consumption in Europe. This was the effect of the successful restructuring process of the Polish economy, changes in marketing practices, the increasing the quality of beer, income, and living standards. As a result, beer has become the most popular beverage in Poland (see Fig. 2).

Therefore, the beginning of the political and economic transformation in Poland was relatively good for large breweries, which quickly went through the process of privatisation and commercialisation. Local breweries were sold out mainly to foreign investors, i.e. international brewing groups such as Heineken, SAB Miller and Carlsberg. The changes resulting from these strong globalisation processes on the beer market in Poland led to having three major brewing companies, accounting for over 80% of the volume of beer sales in the country (Huculak, 2004). The process of consolidations and expansions of global beer corporations and privatisation in Poland was similar to the situation in other Central and Eastern European countries (e.g. Howard, 2014; Pokrivčák et al., 2019; Swinnen and van Herck, 2011). There are certain differences in the success of global beer corporations in this region, however, because of different traditions in consumer behaviour. In fact, acquisitions were especially successful in Poland, where, after the shutdown of small and regional breweries, original brands could still be promoted as regional beers (Materna et al., 2019).

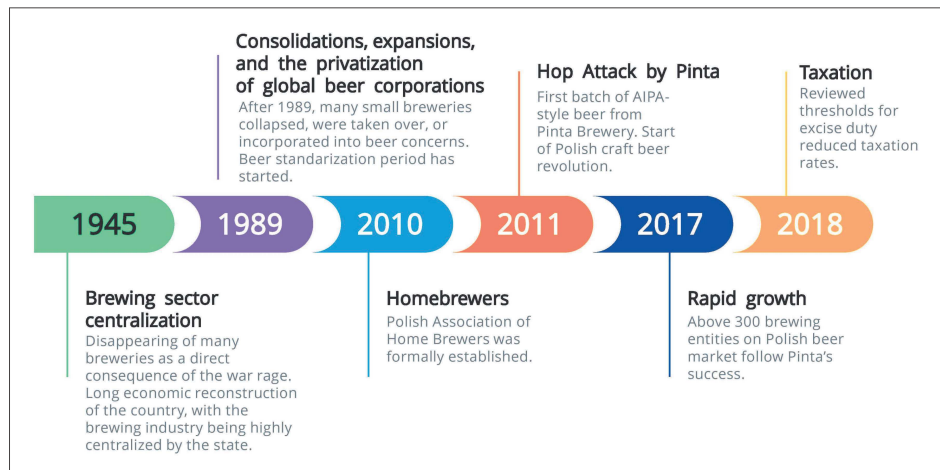


Fig. 2: Modern history of the Polish beer market
Source: Wojtyra et al. (2019)

The beginning of the transformation was difficult for smaller plants which were not able to struggle with an increasingly oligopolistic competition. In the years 1989–2010, many small- and medium-sized breweries were closed. In 1990, only 79 breweries were active, and their number had not changed significantly for years (Huculak, 2010). But the first signs of bottom-up entrepreneurial initiatives in the sector appeared then. Medium-sized regional breweries (with an annual production at the level of 20,000 hl up to 200,000 hl), such as Regional Breweries Jakubiak or Amber Brewery, were established at that time.

The technology and scale of production, as well as the level of beer consumption, have changed over the years, especially as intensive development of the industry was observed in the 21st century. Compared to 1995, in 2015 there was a five-fold increase in technical work efficiency from 1,100.00 hl to 5,700.00 hl per employee. Record investments in the brewing industry took place in 2000, when they exceeded 0.9 billion PLN². Since 2005, the net profit of the sector has been stable and is about 1 billion PLN per year (Szejner, 2017). In Eastern Europe, after 2008 and the global crisis, the beer market continued to grow only in Poland, while in other countries it remained stagnant or a downward trend was observed (Hána et al., 2020). In fact, the Polish beer market became one of the largest in Europe. According to 2017 production data, Poland ranks third in Europe, behind Germany and Great Britain. Considering the consumption of beer per capita, Poland takes fourth place, behind the Czech Republic, Austria, and Germany (Brewers of Europe, 2018).

4.2 Craft brewery and craft beer: Terminology in Poland

Both in Poland and in many other countries, the terms “artisanal brewery,” “microbrewery,” “independent brewery,” or “local brewery”, are sometimes used to describe breweries which brew different types of beer on a “small” scale, which distinguishes them from the mass-produced beer from large breweries. Interestingly, there is no official definition of a craft brewery in Poland. This is in contrast to many countries, e.g. the USA or Italy, where craft brewery is generally defined usually by size (production volume), the production process (traditional or innovative), and its ownership (status of being controlled by a concern; Swinnen and Garavaglia, 2018).

In 2018, the Polish government proposed to lower the beer excise duty rate for smaller breweries, and created the definition of a small brewery according to which this is an enterprise producing up to 200,000 hl per year. In fact, this definition raises further doubts. This is especially the case with the development of small breweries associated with their gradual development and increase in sales, and which then could change their classification. In turn, other medium-sized breweries, focused on the production of a permanent offer of beers based on International Pale Lager, will belong to the group of craft breweries.

According to an unofficial definition of the Polish Association of Craft Breweries, this is an entity that produces or orders beer production which at the same time:

- i. Puts the product quality first; in the beer production process, mainly traditional brewing, raw materials are used: water, malt, yeast, hops and the best and most current brewing knowledge;
- ii. Is known for people making beer, a brewer or person responsible for production are known by name and surname, and are reachable for the end customer;
- iii. Is innovative; through constant work on developing recipes and production technologies it contributes to the development of brewing knowledge; and
- iv. Is independent; it is not personally or by capital connected with a larger producer of beer (a beer concern).

The proposed definitions are still vague, ambiguous, and inaccurate. It is really hard or even impossible to create a good qualitative definition, so the above-mentioned versions have caused a lot of controversy in Poland.

The tax thresholds, valid until 2018, have become the basis for an unofficial (but appearing in Polish literature) classification of breweries into three basic groups, which seem to be practical, although somewhat fixed (Wojtyra and Grudzień, 2017):

1. Small – annual production of up to 20,000 hl (usually microbreweries, restaurant breweries, brewpubs);
2. Medium – annual production of 20,000–200,000 hl (in Poland often named as regional breweries);
3. Large – annual production above 200,000 hl (breweries controlled by concerns).

² 1 EUR = 3.85 PLN (at 2000 – 12–29); 1 EUR = 3.86 PLN (2005 – 12–30); 1 EUR = 4.26 PLN (2019 – 12–31)

A fourth group are contract breweries that are enterprises producing beer using production capacities hired from a stationary brewery with brewing installation³. The proliferation of the last group is one of the main results of the craft beer revolution in Poland.

There is also no clarity as to the definition of craft beer. It can be stated that it is simply a craft brewery product, although there were some attempts to determine what craft beer is. In the Polish community associated with the craft beer market, it is most often defined as beer produced using a craft method by a small and independent brewery, where a brewer is known by name, and the production process and ingredients used are of a high quality⁴. The most popular definition of craft beer in Poland was created for the purpose of the “Kraft Roku” (The Craft Beer of the Year), the biggest commercial craft beer contest in Poland. Such a definition says that any submitted beer must be brewed commercially in an amount not exceeding 5,000 hl per year, and by a brewer known by name.

4.3 The emergence of a wave of craft breweries in Poland

The Polish beer revolution unofficially began on the 28th of March 2011, when the Pinta Brewery brewed in the Brewery at Jura, and then delivered on the market, the first batch of a beer called “Hop Attack”, brewed in the style of an American India Pale Ale. This beer referred directly to the beer revolution in the USA. Unknown earlier to Polish consumers, non-typical raw materials, primarily hops imported from the USA and special malts in the Pintas beers, caused these products to be very popular. In turn, it resulted in a growing interest in craft beer among consumers (Wojtyra and Grudzień, 2017; Wojtyra et al., 2020).

In fact, the Pinta Brewery is the sixth contract brewery in the history of Poland, but only their establishment brought external effects and introduced the fashion for craft

beer to Poland, as well as spreading this form of brewing activity, which is the contract brewery. The impulse for the establishment of this brewery was the success of A’la Grodziskie, the first beer brewed by one of Pintas owners, which was a reconstruction of the recipe of the defunct Polish beer style called Grodziskie. The beer had its premiere in June 2010 at the Biurofilia Festival that had been the biggest beer event in Poland for many years.

Pinta’s success had many followers. As a result, after 2011, new breweries began to appear in Poland, essentially microbreweries, restaurant breweries, brewpubs, and contract breweries, focusing on the production of the ‘new-wave’ craft beers. They present a wide portfolio of beer brands, brewing beer in all available styles, especially ales such as stouts and IPAs. They usually try to refer to the global trends observed on the craft beer market, for example in the USA. In 2019, the number of unique beer premieres exceeded 2,400, whereas in 2013 it was 82 (see Fig. 3). A few years ago, only a dozen or so brands were well-known for Polish consumers. These days the most popular groups of styles are India Pale Ale (767 new unique beers in this style in 2019), Pale Ale (261), Stout (297), Sour Ale (268), and also Barrel Aged Beers (202 in 2018) – see Groń (2020).

The number of brewing entities in Poland, including contract breweries, increased rapidly between 2010 and 2019 from 70 to about 420 (Fig. 3). Such a rapid increase in the craft beer market was unknown in modern Polish history. In the analysed period, a systematic and continuous growth of new breweries was noted annually. What is relevant and worth emphasising, is that the number of medium-sized and large breweries has not changed: hence, small brewers are primarily responsible for the growth.

The craft beer revolution means not only a change in the number of new breweries and beers on the market, but also some external effects in socio-economic development and

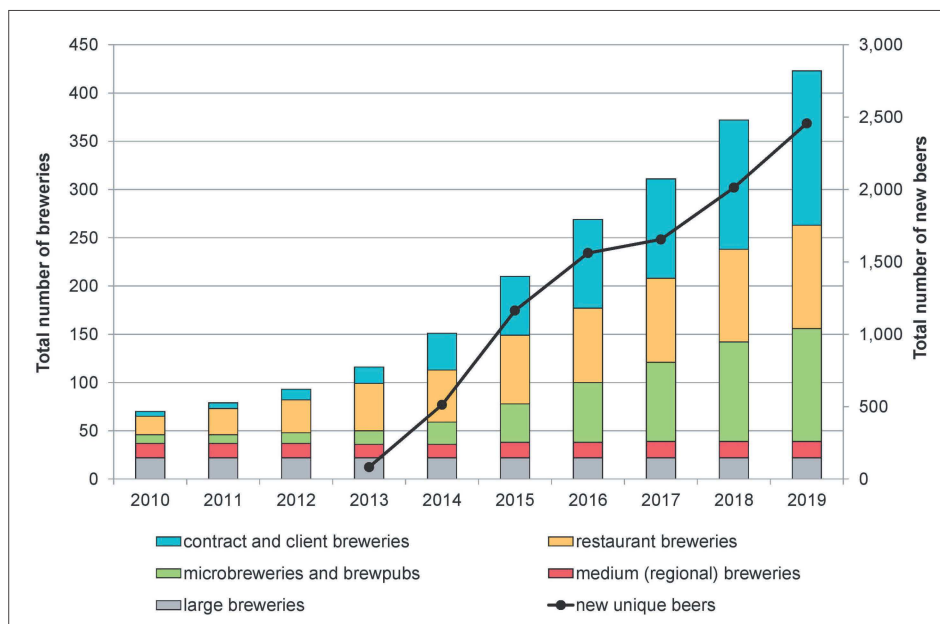


Fig. 3: Change in the number of breweries and new, unique beers delivered on the market annually in Poland during the Polish craft beer revolution

Source: Based on The Beer Map and author’s data collection

³ This term is variously defined depending on the country. It can be also defined as a beer firm, collaboration brewery, client brewery, gypsy brewers, phantom breweries, cuckoo breweries, etc. (see Swinnen and Garavaglia, 2018)

⁴ See <https://kilkaslowopiwie.com/2015/10/29/co-to-jest-piwo-rzemieslnicze-i-czym-jest-browar-rzemieslniczny/>

culture. People have started to ‘groove’ on beer history, the production process, etc. As a result, beer vlogs, blogs, and forums on the Internet have become very popular. Moreover, the number of new Polish nation-wide beer festivals has increased annually since 2010, from about 10 extant in 2013 to about 50 in 2018. Furthermore, the importance of beer tourism has been growing (Rogowski, 2016). The effects of the craft beer revolution has also helped Polish hop plantations, which suffered economically in the 2000s. What have also appeared on the market are historical and experimental Polish hops, e.g. Izabella, Oktawia, Tomyski, Iunga, Magnat, Puławski, Zula, or Polish Cascade (Portal Spożywczy, 2019)⁵.

5. Results and discussion: Determinants of change in the craft beer market in Poland

5.1 The resource-partitioning model, niche market, and consumption habits

Undoubtedly, from an economic point of view, the beer market in Poland after 1989 was heading towards oligopoly, so it was dominated by several large entities (Boratyńska, 2009). In 2017, Carlsberg Polska, Kompania Piwowarska/Asahi (formerly SAB Miller), and Żywiec Group/Heineken controlled 78.2% of the Polish beer market (Deloitte, 2018). This can also be confirmed by analysing the market from the consumer side, because it should be recognised that the offered product is homogeneous, i.e. the consumer is not able to distinguish which industrial brewery the beer comes from (Allison and Uhl, 1964; Jacoby et al., 1971; Scherer, 1996; Moore et al., 2016). The product had been prepared to suit the widest target audience. Primarily, efficient marketing played a huge role in achieving this objective. Some observers have indicated the large impact of advertising on the increase in beer sales (e.g. George, 2009). In Poland, the dynamic development of television from the mid-1990s was particularly important. The advertisements drilled not only names of brands, but

also consumer habits such as serving beer at a very low temperature, which was supposed to hide nuances in taste. As a result, beers from the largest brands were remembered in the minds of consumers as the International Pale Lagers that became the most often sold and bought style of beer in Poland.

Meanwhile, in response to the International Pale Lager flood on the market, consumers began to look for variety. In 2011, only craft breweries in Poland offered an alternative. This is why the first microbreweries on the market were so successful. Craft breweries produce a variety of atypical beers that satisfy sublime tastes. Besides, craft breweries are always associated with the work of a small, local, independent and innovative entity that provides customers with new and surprising taste experiences (Nilsson et al., 2019). Thus, consumers’ needs lowered the market entry barrier, which encouraged others to open their own small breweries.

On the one hand, the established oligopoly still controlled the entire beer market for years, but on the other hand, it imposed specific requirements on its participants. Every large producer would have to take into account moves of the competition, which caused difficulties among oligopoly leaders in adapting to dynamic market changes (Hannan and Freeman, 1984). The spontaneous action is very risky. As a consequence, the largest brewing companies in Poland expanded their portfolio into beers from the ale family only a few years after the craft beer boom. The Kompania Piwowarska and Żywiec Brewery, launched in the period of the craft beer revolution, a series of beers referring directly to the craft beer wave – such as AIPA, APA, IRA, American Wheat, Saison, Witbier, Golden Ale, etc. These types of beers, however, still represented a small ratio of the sales volume of the industrial breweries.

What is worth emphasising is that the craft beer revolution in Poland, as compared with western markets, appeared later in time. On the one hand, it was because the country was functioning in the free market for only a relatively short time, and on the other hand, the international brewing companies

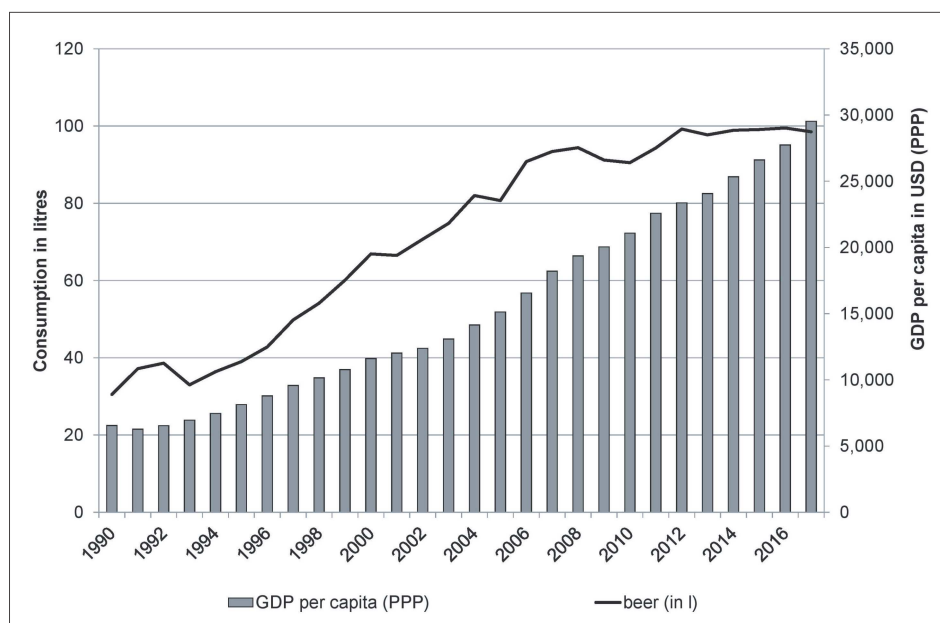


Fig. 4: Consumption of beer compared to GDP per capita in Poland between 1990 and 2017
Source: author’s elaboration based on Statistics Poland and World Bank data

⁵ See <http://www.portalspozywczy.pl/alkohole-uzywki/wiadomosci/coraz-wiecej-polskich-odmian-chmielu,135496.html>

were aware that the beer industry was deeply rooted in Polish culture and Poles were loyal to what is local. This is due to the fact that beer is more closely intertwined with the concept of national identity and pride than other products, which is proved by the sales results of global brands (Stack et al., 2016). Therefore, the group's strategy called 'multi-tier', was to combine global and local brands (Chlebicka et al., 2018; Meyer and Tran, 2006). Sometimes, this strategy assumed the relocation of a beer brand production to another brewery. As K. Materna et al. (2020) noted, this process breaks the strong link between the brand and its place of origin. Originally, in Poland, this strategy of 'false regional identity' was successful, but the brewery products taken over by the concerns were 'unmasked' by consumers over time. In Poland, the operation of the resource-partitioning model also overlapped with other phenomena that supported this process. First of all, beer consumption in Poland has been rising regularly since 1990 (see Fig. 4).

With increasing consumption, the probability that part of the population will be open to new, unusual products increases, as is the case with innovation (Moore, 1999; Rogers, 1962). At the same time, average incomes in Polish society also increased at a similar rate, similar to the case of other middle- and low-income countries (Colen and Swinnen, 2015). The Pearson correlation coefficient for these two variables over the years 1990–2017 was 0.93. Studies show that high-income consumers are more likely to buy craft beer (Elzinga et al., 2015; Murray and O'Neill, 2012; Pokrivčák et al., 2019). B. Aquilani et al. (2015) report that particularly wealthy consumers in Italy have changed from

premium lagers to special or craft beers. This is relevant because bottled craft beer in Poland is usually 3–4 times more expensive than the International Pale Lager from a large brewery. According to the Birofilia Report, beers that are not International Pale Lager attract consumers who can afford to pay 5–10 PLN and more (Birofilia, 2018).

In this respect, what is worth highlighting is that the income of residents of agglomeration areas in Poland, such as Warsaw, Wrocław, Gdańsk or Poznań, is higher than in other parts of the country (Statistics Poland, 2018), and primarily they have access to craft beer thanks to numerous craft beer pubs, specialist beer stores, or beer festivals (see Fig. 5). Thus, the craft beer revolution in Poland has the chance to develop quickly, especially in cities (Wojtyra et al., 2020).

Secondly, in comparison to the 1990s, along with growing income, consumer preferences in Poland have also changed significantly. In the analysed period, the consumption of strong alcohols decreased in favour of weaker alcoholic drinks, including beer (Krzemiński, 2013). In western Poland, patterns of alcohol consumption began to change gradually (Siemieniako et al., 2013): more and more people wanted to drink less, but drink better according to global key trends (Arthur, 2018).

An important factor in this situation is that although any deteriorating financial situation forces change in consumer preferences, it is difficult to give up acquired consumption habits and lifestyle (Śleszyńska-Świdorska, 2013). Customers, who are satisfied with the change in beer consumption habits, will not be willing to accept the need to return to

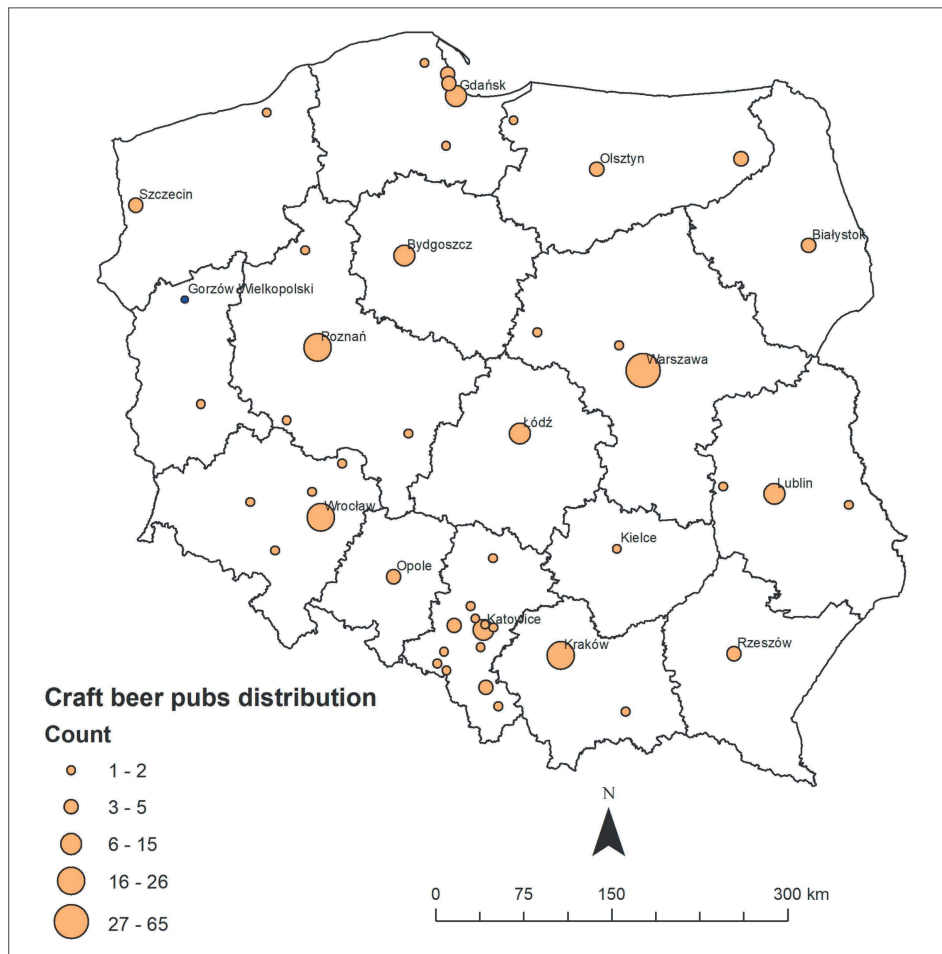


Fig. 5: Spatial distribution of craft beer pubs in Poland in 2019
Source: Based on *The Beer Map* and author's own data collection

regular concern beers. In turn, a group of convinced craft beer drinkers eventually had a growing number of followers among consumers.

Thirdly, it is also significant that the Millennial generation plays an important role in the Polish craft beer revolution. According to the report for Biografia (2018), in Poland young adults live and think quite differently than previous generations, they take the opportunity to choose, look for flavours, are not afraid of experiments. Young Millennials have no habits associated with the presence of alcohol volume in beverages, so experimenting with flavours, aromas, and brewing additives plays an increasingly important role. For 38% of the respondents up to 25 years old, a favorite beer style is pale lager. This is a significantly lower ratio than in a group of older people. Young adults, especially those living in agglomerations, are more eager to reach for beer specialties. In turn, older representatives of this generation are increasingly willing to pay a higher price for potentially higher quality.

5.2 Globalisation, diffusion of innovation, and development of homebrewing

The founders of the Pinta Brewery formed their ideas when travelling to the United States; and then they applied their knowledge about the craft beer market to Poland. That is why they could reproduce styles previously unknown to the average Polish consumer. In addition, they chose the right moment to spread the idea of craft beer because Polish society craved variety in the market. The Pinta Brewery had many followers and the number of new brewing entities began to increase rapidly in a short time. Products created in cooperation amply confirm this idea. In 2019 alone, Polish breweries cooperated in launching a new beer brand 80 times in foreign breweries and 65 times with other domestic craft breweries (Groń, 2018).

In Poland, home brewing has become an important foundation for the proliferation of craft brewing, as had taken place in other countries (Swinnen and Garavaglia, 2018). The predictability and boredom of the market offer caused an unexpected increase in the popularity of home brewing, which later evolved into contract, craft and restaurant brewing (Podeszwa, 2015). In fact, the tradition of home brewing in Poland dates back much earlier than the craft beer revolution. In 2001, one of the owners of the Pinta Brewery opened a store with products for home brewers. Then, in August 2010, an organisation bringing together the community of home brewers – the Polish Association of Home Brewers – was formally established, and it has now about 1,200 members. It is estimated that in Poland about 100,000 people brew beer at home. The increase in

the number of home brewers is confirmed by the growing number of such registrations during home beer competitions (Biografia, 2018).

Before microbreweries appeared in Poland, home brewers re-created and formulated recipes for beers not available on the domestic market. Therefore, the diversity of the beer world was known to them, and as soon as it became possible to use its resources on the domestic market, they used it as both consumers and producers. The community of home brewers became the foundation for the market. The increased activity of entrepreneurs in the beer industry created an opportunity for home brewers to commercialise their hobbies and to start a casual adventure with brewing on a commercial scale (Wojtyra et al., 2019). The creators of the Pinta Brewery took advantage of the experience they gained over the years as home brewers (Pinta, 2015). The low entry barrier and the exit one simplify the setting up of new contract breweries, for example (van Dijk et al., 2018).

As Polish industry experts note, there would be no beer revolution without home brewing, because professional brewers were not educated in Poland (Rogacyn, 2017). With the scarcity of Polish professional literature in the field of brewing, on-line groups and discussion panels, as well as foreign ones, which became a source of inspiration and knowledge, played an especially important role. Therefore, the experience of home brewers in the initial phase of the revolution was crucial for the newly-founded brewing entities.

5.3 Neolocalism

The case of the Polish craft beer market partially confirms this concept of the importance of the local. Many of the breweries strongly use brand-related marketing in their strategy and refer to locality. This situation applies essentially to stationary breweries, because of their permanent residence related to ‘the place’. Neolocalism in this aspect manifests itself mainly in three ways. A studied local reference includes: the name of a brewery; the name of the beer; or a label that uses a symbol, a graphic, or a photograph referring to the locality. Among the 199 small and restaurant breweries in Poland that operated in 2018, 86 (43%) have a name that directly (place name, other geographical objects in the name) or indirectly (symbolism of the place, slogan related to local tradition, history, etc.) refers to the place in which the beer is brewed (see Tab. 1). In contrast, in the case of contract breweries, this phenomenon is rare. There is not such a strong connection with the place, because a contract brewery does not have a permanent brewing place (‘gypsy brewing’). The name of only 29 out of the 89 classified contract breweries

Name of brewery	Number of microbreweries	Number of contract breweries	Examples
Name of city	47	15	BroWarka, Karczewski, Miedzianka, Milicz, Bednary, Łańcut
Name of other geographical object	21	6	Dolina Bobru, Wieżyca, Pustynny
Other reference to locality	18	8	Bazyliszek, Stu Mostów, Hajer, Za Miastem, Rock Browar Jarocin
Total number of breweries in categories	86	29	-
Total number of breweries	199	89	-
Share [%]	43.2	32.5	-

Tab. 1: Neolocalism references in the names of Polish craft breweries in 2019

Source: author's data collection

can clearly relate to the region of origin. Such cases as the Szal Piw Poznań contract brewery, whose beer names are in dialectal language, are marginal.

Neolocalism may also explain how the craft beer market continues to grow. Craft breweries are often closer to their customers in the local community. Unlike large concerns, the brew-master of a small brewery is often well-known by name (as mentioned in “Kraft Roku”). What is more, the brewery representatives are involved in supporting local events, such as beer festivals, tap takeover in craft beer pubs, and seasonal events, creating a community that advertises the region. Emphasising local identity and uniqueness, microbreweries use targetted marketing strategies and intentionally satisfy the desire to connect with the local community.

In Poland, this factor is relevant, but is not a key determinant, if one compares these results with the map of craft beer pubs where the biggest cities dominate. According to the “Portrait of a Polish craft beer drinker”, about 70% of beer customers live in a city with a population larger than 150,000. Craft beer, although consumed and produced mainly in cities and their agglomerations, is also produced in smaller centers. Craft beers coming from different regions are available in the whole country, however, so the sale is not only local (Groń, 2015). While the marketing strategy is not based on neolocalism, it is targetted at a specific group of regular customers known as ‘beergeeks’ (birophiles), who are keenly interested in craft beer. Analysing the form of advertising, it can be observed that the craft breweries in Poland professionally manage profiles in social media and gather this target audience. Groups on Facebook like “Jepiwka” (14,000 members in 2019) devoted to discussions about the Polish craft beer market, the recommendation system available on Internet websites and apps like Untappd, where anyone can evaluate and describe tasted beers, have evolved rapidly during the beer revolution.

The need for variety, especially among beergeeks, has caused a lot of consumers to still look for new beers. They just want to sample another beer. They reluctantly come back to beers which they drank and rarely show brand loyalty. As a result, the phenomenon of hyper-differentiation can be observed. In 2019, the number of unique beer premieres exceeded 2,400. Every year, the most fertile breweries present between 30 and 50 new beers. Only in 2019, three Polish breweries brewed and launched more than 50 new, unique beers: Ziemia Obiecana (63), Funky Fluid (51), and Piwne Podziemie (51).

5.4 Path dependence

The decisions regarding the larger concerns’ strategy and the appearance of the Pinta Brewery determined the further development of the beer market in Poland. Moreover, the historical and geographical context, presented in more detail in the first part of this article, also influenced those events. As Niemczyk (2017) observed, the International Pale Lager as a style of beer dominating the Polish beer market from the supply side is the culmination of brewing art subjected to the strict rigors of large-scale production and distribution. Therefore, it is natural that every producer who wants to gain a large market share must offer high quality lagers at a good price (cf. Niemczyk, 2017).

Polish large breweries are locked into brewing industry standards. The turning point in the development of the beer market in Poland, as already mentioned, is the introduction of the first AIPA brewed by a Polish brewery. This event determined everything that took place after its occurrence.

It is hard to imagine that in the near future there would be a complete return to the situation before the craft beer revolution. The decisions taken by brewing companies, which at the turn of the 21st century focused completely on the production of one style of beer, mean that today they have difficulties in adapting to economic and cultural changes. Medium-sized and small breweries in recent years have taken advantage of the internal drawback of the beer oligopoly and shaped a new path (Niemczyk, 2017). Tomasz Kopyra, a Polish expert in the field of brewing and the author of one of the most popular vlogs about beer in the world, noted that (translated from Polish language by the author):

“brewing companies are like big tankers who have to decide two days earlier that they will change course. In contrast, small breweries are pirates on inflatable boats who circle around these tankers. They are not able to sink this ship, but they make life difficult for them” (Rogacin, 2017).

Of course, the innovation dynamics have also been replicated by the three main brewing companies, which started to diversify portfolios and gradually introduced new styles. Their offer, however, is still sparse in comparison to craft breweries. Moreover, their reaction was late and generated by the emergence of the microbreweries.

6. Conclusions

This article has investigated the principal reasons behind the proliferation of craft breweries in Poland. The craft beer revolution is a kind of socio-economic phenomenon, which occurred contrary to the principles of classical economics and the rules of the development of an oligopolistic market. The phenomenon has shown that diversity and the ability to choose from a wide range of products can be important for the customer, and beer can be a commodity of high quality with its price and marketing strategy different to those imposed by oligopoly members.

As J. Swinnen and C. Garavaglia (2018, p. 3) write:

“Craft brewers and their customers have transformed global beer markets over the past two decades. They ended a century of consolidation of breweries, resulting in the domination of a few global multinationals and the homogenisation of beer. They started small and isolated, but ultimately transformed a global industry. Their counter-revolution against the domination of the macrobrewers and their uniform beer styles has totally transformed the global beer scene.”

The reasons for the emergence and development of the craft beer industry in Poland are summarised in the following model (Fig. 6). The turning points were the years 1989 and 2011. The first concerns the moment when socialism collapsed in Poland, which resulted in the opening of the market and the emergence of international brewing concerns. The second date is the commonly-accepted beginning of the craft beer revolution, when the Pinta Brewery was the first to introduce a previously unknown beer in the style of AIPA to the market, a time referring to the trends present in other countries, including primarily the USA.

Many factors influenced the creation and development of this phenomenon. Some were analogous to those that appeared earlier in other beer markets in the world and can be based on theories and concepts related to economics or socio-economic geography, for example the resource-partitioning model, a niche market, neolocalism, path dependence, or the diffusion of innovations. Other reasons result from the specifics of the Polish market and changes

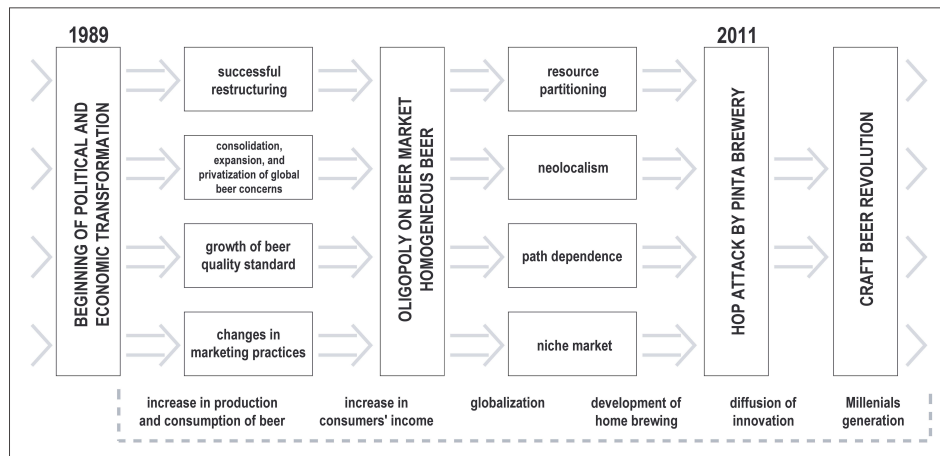


Fig. 6: Cause and effect diagram – determinants of changes in the beer market in Poland
Source: author's elaboration

in its environment, among them the domestic increase in beer production and consumption, the dynamic growth of inhabitants' incomes, and the great success of large brewing companies in the 1990s and 2000s, which occasioned the later start of the beer revolution. No doubt, some of the individual elements need to be examined in more detailed tests.

The increase in the number of breweries in the period 2011–2019 maintains an exponential trend. The same is true for the number of new craft beers that are introduced in the market. Interest in the craft beer market is growing. As far as supply is concerned, the observed phenomenon is strongly embedded. It seems to have an irreversible course and consumers are already accustomed to the presence of craft beer in stores. Taking into account the markets where the beer revolution has lasted longer, as well as the scale of the Polish market and production volume as well as consumption, one can expect a further increase in the importance of this sector. According to the Polish Association of Home Brewers (2019), the share of craft beers in the Polish brewing market is around 1.6–2.0% of sales volume.

Although this phenomenon is referred to as a “revolution”, it is rather evolutionary in its nature when considering the demand. The control of the beer market taken over by the three international brewing companies resulted in Polish society getting ‘stuck’ in their attachment to International Pale Lager. Therefore, the change in preferences for the vast majority of consumers is a very difficult and long-lasting process. It is difficult to judge whether it is achievable at all.

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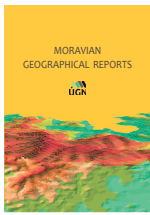
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Geographies of tacit knowledge transfer: Evidence from the European co-authorship network

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Abstract

The patterns of scientific cooperation between the 28 European Union (EU) member countries, Switzerland and Norway, from 1993 and 2017, are evaluated in this article. We consider co-authorship patterns to be proxies for international transfers of tacit knowledge. The theoretical part of the paper contains propositions by researchers in evolutionary economic geography on path-dependence, selection and variation, and the role of networks in knowledge transfer. The principal argument is that the geographical configurations of knowledge transfers over distance are shaped via a set of connectivities – specific communication channels for the exchange of people, goods and knowledge between two or more countries. Some connectivities are more conducive for the transfer of explicit knowledge (e.g. merchandise trade, trade in patents), while human exchange flows (students, migrants, travellers) favour the transfer of tacit knowledge. The research project found that a considerable increase in human exchanges has helped to increase the total number of co-authored papers, but did not amend the geography of the European co-authorship network over last two decades. Rather, the layout of the network stems from a relatively stable set of historical, cultural and political legacies in Europe.

Keywords: Cooperation in science, co-authorship patterns, tacit knowledge transfer, evolutionary economic geography, connectivities, Europe.

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1. Introduction

Contemporary international cooperation in science encompasses virtually all countries of the world. The increase in international collaboration refers not only to technological advancement and the globalisation of trade in goods, capital and knowledge, but also to the increase in science and technology (S&T) capacity in many countries over the past 30 years (Wagner et al., 2015, p. 7). Common beliefs imply that technological advancement in information technologies and organisational innovations in the transport industry should result in an overhaul of patterns with respect to international scientific collaboration. With the rise of the Internet, the arrival of low-cost airways, and English as a global language, physical Geography and cultural Geography might appear to be less important than ever. Yet, studies on international cooperation in science and technology imply that ‘Geography Matters’ (Frenken et al., 2009; Morescalchi et al., 2015). As a matter of fact, there is a growing tendency to co-publish with long-distance partners (Frenken et al., 2009). At the same time, co-publication patterns remain geographically

localised (Hoekman et al., 2010, p. 667). This conclusion applies also to countries belonging to common economic and political spaces, such as the European Union.

This paper addresses an important gap in research on international cooperation in science. We analyse the distribution of scientific papers co-authored by scientists from at least two European countries. We demonstrate that geographical configurations of knowledge transfers over distance account for a substantial degree of stability over the long term. We argue that the configuration of co-authorship networks is path-dependent and shaped via specific communication channels – ‘connectivities’. Some connectivities are more conducive for the transfer of explicit knowledge (merchandise trade, trade in patents, etc.) while human exchange flows (students, migrants, travellers, etc.) clearly favour the transfer of tacit knowledge. Approaches in economic and human Geography are integrated with network science and quantitative analysis. The theoretical part of the paper refers to research propositions by evolutionary economic geographers (EEG) on path-dependence, heredity

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and variation (Essletzbichler and Rigby, 2007; McKinnon et al., 2009), and the role of networks in knowledge transfer (Boschma and Frenken, 2006; Glückler, 2007).

The paper is organised as follows. The second section presents the theoretical background of the study: firstly arguing that scientific work has significant tacit dimensions (Bathelt and Glückler, 2011; Bathelt and Henn, 2014). The transfer of tacit knowledge is tied to face-to-face contact, i.e. human mobility. A survey of relevant literature indicates that human mobility was a neglected variable in studies of international knowledge transfer. The basic propositions of EEG are described and relates these to transfer of tacit knowledge. This section also introduces the concept of ‘connectivities’ – specific communications channels for the exchange of people, goods and knowledge. Subsequently, data sources and variables used in the analysis are introduced. We conceptualise major drivers shaping configurations of knowledge transfers over distance in Europe from 1993 to 2017. The geographical layout of knowledge transfers is approximated via co-authorship networks. Papers co-authored by partners from at least two European countries in the Web of Science database are used to establish the spatial patterns of intra-European cooperation in science. The evolution of co-authorship networks over time is analysed via network science methods (Easley and Kleinberg, 2010) in the next section. Some major determinants of knowledge transfer are identified and approximated via a set of connectivity variables. Factor analysis and regression are then applied in order to determine the relationships between the network structure and the underlying connectivities. Network organisation in major geographical modules and its evolution over time is the main point of interest subsequently. The path-dependent patterns of centre and periphery are interpreted from the perspectives of EEG. In the conclusions we consider relationships between connectivities and assumptions by EEG on path-dependency and path-creating in the European co-authorship networks.

This application of a connectivity approach is a novelty in research into co-authorship networks. We identify major connectivities in trade in knowledge and goods, as well as in human mobility, in shaping the geography of European co-authorship networks. We use such connectivities to explain the evolution of the geography of scientific cooperation over a quarter of a century. Indicators of human exchange are, to our best knowledge, used for the first time to study the geographical layout of international cooperation in science. Other original aspects of this work include the focus on intra-European cooperation, the long-term view (25 years), and the high number of publications analysed.

2. Theoretical background

2.1 The tacit dimension of scientific work

The concept of tacit knowledge was introduced by Polanyi (1966, p. 4): “We know more than we can tell.” Tacit knowledge refers to knowledge that we know that we possess but are unable to quantify – or even express, according to some authors. Tacit knowledge can be only ‘produced in practice’ (Maskell and Malmberg, 1999, p. 172) and acquired only via personal experience, such as the “informal take up of learned behaviour and procedures” (Howells, 2000, p. 53). As summarised by Nonaka and Krough (2009, p. 606): “Knowledge that is uttered, formulated in sentences, and captured in drawings and writing is explicit. Knowledge tied

to the senses, tactile experiences, movement skills, intuition, unarticulated mental models, or implicit rules of thumb is tacit.” Typical examples of tacit knowledge include knowing “how to ride a bicycle”, “how to do a surgery” and/or “how to write a scientific paper”. The key difference between explicit and tacit knowledge relates to the mode of acquisition and transferability. While it is easy to send the results of an experiment via post or email, the ability to perform an experiment is subject to personal learning.

Blackler (2002) recognises four types of tacit knowledge:

1. *Embrained knowledge* helps individuals to recognise underlying patterns and organise information according to specific narratives. Establishing scientific theories from a large body of measurements is an example of embrained knowledge in scientific work;
2. *Embedded knowledge* helps us to understand routines, roles and procedures without conscious learning. How to conduct an experiment, how to fine-tune research procedures and how to write a scientific paper are examples of embedded knowledge. Many research procedures contain a tacit component, which is difficult to learn and transfer without face-to-face contact;
3. *Embodied knowledge* refers to intuitive manual and cognitive skills stored in the ‘body and mind’ (Toner and Wooley, 2008). The acquisition of embodied knowledge helps to operate along intuitive pathways and undertake working tasks effortlessly; and
4. *Encultured knowledge* refers to collective tacit knowledge shared by individuals. It derives from shared understandings via socialisation and acculturation. Science is international, but scientific work happens within specific cultural environments. Encultured knowledge relates not only to cultures of nations and ethnic/social groups, but also to various organisational cultures. Socialisation and acculturation build both affect-based and cognition-based trust. Such trust, in turn, promotes the use and transfer of tacit knowledge (Holste and Fields, 2009).

Communication in joint research projects can take many forms. Modern technologies (e-mail, Skype, Zoom, etc.) enable the exchange of ideas without a physical presence. Yet, some research tasks are difficult to perform over distance. Each creative task has a tacit dimension. The tacit dimension is difficult to transfer without face-to-face contact. Tacit knowledge is a necessary (if not sufficient) precondition for trans-local cooperation. While all four types of tacit knowledge are necessary preconditions for scientific work, encultured knowledge is a key determinant for the geography of international cooperation in science. Geographical space forms ‘cultural, social and psychological space through which knowledge is generated and imparted’ (Howells, 2002, p. 874). Research institutes and countries may differ vastly in their languages, social norms, cultural habits, historical and socio-cultural heritages and/or organisational routines. The lower the barriers (and the stronger the enhancers), the easier the cooperation. Knowledge transfer is enhanced when partners already share relational proximity based on former joint work experiences or close social relations (Bathelt and Glückler, 2011). As for the cooperation with respect to patents and publications, face-to-face contact is the only way in which to acquire and transfer tacit knowledge. Most co-authors of scientific papers tend to know each other in person. Many of them work on joint international projects and engage in frequent

personal exchange in conferences, seminars and/or long-term visits. Face-to-face meetings help to build trust-based linkages (Bathelt and Henn, 2014) and enhance the potential for future co-publications.

2.2 Evolutionary economic geography and networks of co-operation in science

The EEG is inspired by evolutionary economics. It considers the spatial distribution of economic activities as an outcome of largely connected and path-dependent historical processes (Koegler, 2015). Path-dependency is a key concept of EEG. Path-dependency results from cumulative causation. Events occurring in the past may have long-term effects on current and future operations of the networks of firms, institutions or individuals. Other important concepts in EEG include variety, selection and retention (Essletzbichler and Rigby, 2007). The retention process refers to cumulative reproduction and reinforcement of the network structure. Variation, on the other hand, refers to mechanisms of novelty, disruption and potential path disruption. The EEG primarily analyses evolution of formal institutions (such as firms, countries, governance bodies) and informal institutions (such as clusters and networks). The EEG considers institutions as relatively stable entities that change only slowly over time, but this can be disrupted by sudden events as new development pathways are opened and new path-dependent trajectories established. The focus on historical perspectives and evolution makes EEG different from the new economic geography (NEG) and institutional economic geography (IEG). The NEG considers agglomeration effects and concentrates on transport and transaction costs, while IEG explains differences in spatial development via different sets of institutions.

Actors usually operate within networks, and the process of selection is driven by the activities of agents. Networks are vehicles for transactions in goods, services and knowledge. Connections in a network are relations between pairs of agents. The selection of a partner is determined not only by external pressures, but also by the decisions of actors. Actors operate under uncertainty and bounded rationality, and the formation of ties is subject to considerations of potential costs and benefits. It is better to engage in transactions with minimal costs, and to transact with agents with similar geographic, cultural, institutional and cognitive settings. Actors generally would explore ties with partners with whom they are most familiar. As noted by Essletzbichler and Rigby (2007, p. 557) actors would use 'relational assets based on the social properties of (localised) networks including tacit knowledge, embedded routines, habits and norms, local conventions of communication and interaction, reciprocity and trust'. For successful co-operation it is important to be in the right network, but also in the right place within a network. The structure of a network is established via the social interaction of actors (network 'nodes'), and incumbent actors would prefer cooperation with their current partners. Any new entrants would seek attachments to well-connected partners ('influential nodes') so as to benefit from multiple connectivities. Influential nodes further increase their connectivity, while peripheral nodes tend to remain peripheral, a process is known as 'preferential attachment' (Glückler, 2007). The preferences of incumbent actors for their current partners, as well as new entrants for influential nodes, results in cumulative causal patterns and reinforces the centre-periphery structure of the network.

The architecture of networks, with regard to flows of goods, knowledge and people, tends to follow rules of geographical, cultural and linguistic proximity (Luukkonen et al., 1992; De Prato and Nepelski, 2004; Felbermayr and Toubal, 2010). Boschma (2005) recognises four types of proximity. Cognitive proximity (the proximity of embrained knowledge) is the degree of overlap in two agents' knowledge bases. The overlap is an indispensable condition for efficient communication. Organisational proximity is the extent to which relations are shared in an organisational arrangement, either within or between organisations. Social proximity refers to social embeddedness of agents in terms of friendship, kinship, and experience. Common organisational and social routines, roles and procedures (embedded tacit knowledge) promote better cooperation. Effectively, such embeddedness is a precondition for forming trust. Geographic proximity is represented as the physical distance between agents.

Jennissen (2007) introduced the concept of 'connectivities', as a factor that embodies specific communication channels for the exchange of people, goods and knowledge between two or more countries. Connectivities support building relational assets and reducing transaction costs. Furthermore, Jennissen (2007, p. 420) recognises two types of connectivity:

1. Cultural connectivity involves multidimensional shared institutional legacies such as language, political and cultural history and/or legal systems. Cultural connectivity is a proxy for cognitive and organisational proximity. Possessing knowledge of a partner's language, culture and/or organisational setups (embrained, embedded and encultured knowledge) has two advantages: it makes mutual communication easier and the results of exchange more predictable; and
2. Material connectivity includes technologically influenced geographical proximity such as transport and communication networks conducive to international exchange in trade, goods and knowledge. Moreover, it decreases transport and other transaction costs. Shares of neighbouring countries in total merchandise trade often are higher than expected with respect to the size of their economies.

Material and cultural connectivities sometimes overlap, as many neighbouring countries share their languages and cultures. Connectivities help to reduce uncertainty regarding transaction outcomes and, thus, transaction costs between partners from different countries (Howells, 2002; Bathelt and Henn, 2014). Shared institutional legacies explain why much of the intra-European exchange of goods, people and knowledge is path-dependent and facilitated by long-term connectivities.

2.3 The research gap

Do configurations of knowledge transfer over distance exhibit some distinctive geographical patterns? The substantive literature on international cooperation in science does indeed indicate that co-authorship patterns follow some well-established economic, cultural and political configurations.

Two principal methods are applied in the study of international collaboration in science: network analysis and gravity models (see Tab. 1). Network analysis examines certain properties of collaborative networks, such as network density and measures of centrality. Network science has

been applied to the study of the structure and evolution of scientific landscapes and early studies mapped co-authorship networks in specific scientific fields such as biomedicine and physics (Newman, 2004). Other streams of research have concentrated on the economic, cultural and political geography of international collaboration in science. Studies in this stream usually find considerable heterogeneity of the European research space (Wagner et al., 2017). Moreover, gravity models are often applied in spatial analysis, as these models observe predicted and actual flows of goods, services, patents and/or migrants and analyse differences between predicted and observed exchanges. It is noted that exchanges between country pairs are proportional to some hurdles (such as distance) or to some enhancers (such as trade agreements or common languages).

The unit of analysis varies in studies of international collaboration in science, determining both the sample size and the availability of explanatory variables (see Tab. 1). Some papers on co-publications use data on authors' home institutions (Pan et al., 2012), whereas city-level analysis enables the construction of very large networks. Most studies on European cooperation in science focus on NUTS 2 or NUTS 3 regions (plus Norway and Switzerland). Physical distance and regional dummy variables (neighbourhood, institutional and cultural effects, technological distance) and research and development (R&D) capacities (R&D spending, R&D personnel) are usually employed as explanatory variables in network analysis and gravity models. The regional approach allows for a sample size between 175 (Paci and Usai, 2009) and 5,552 members (Chessa et al., 2013). The common finding is that neighbouring countries and regions cooperate more often than distant ones. Regional dummy variables are proxies for cultural and linguistic barriers in network analysis and gravity models. Large samples are best suited for network analysis, but are accompanied by a drawback – the limited numbers of potential explanatory variables. The acquisition and transfer of tacit knowledge is possible only via human exchange, and regional dummies cannot directly measure the potential for the transfer of tacit knowledge. Data for some potentially important explanatory variables (flows of migrants, travellers or students) are available only at the country level. We assume that data on human exchanges are the best possible proxies for the transfer of tacit knowledge.

This survey of the relevant literature indicates two research gaps. Firstly, all papers are empirical in their nature. They follow the evolution of cooperation in science and technology, but provide no conceptualisation of such evolution. Interestingly, most papers in the survey refer to the influential papers by Boschma (2005) and Boschma and Frenken (2006), but none of them interprets their findings in terms of EEG. Several important events happened in the period 1993–2017: four rounds of the EU enlargement; the introduction of the Schengen area; the 2008 financial crisis; and the creation of the European Research Area. This long period provides an unique opportunity to test the EEG assumption on path-dependency and path-creation. Secondly, no paper focuses on the role of tacit knowledge in international cooperation in science. If tacit knowledge can be acquired and transferred only via face-to-face contact, proxies for human exchange are needed in order to understand the impact of tacit knowledge on the geography of international cooperation in science.

Referring to the assumptions of EEG, we propose the following hypotheses:

- H1: Connectivities in trade in goods and knowledge, as well as in human mobility, explain a substantial part of the configuration of co-authorship networks;
- H2: The importance of human exchange for the geography of European co-authorship networks increases over time; and
- H3: Connectivities in trade in knowledge and goods, as well as in human mobility, are shaped by shared long-term historical, cultural and political legacies. The path-dependent architecture of co-authorship network implies its relative stability and resilience to disruption.

3. Data and methods

3.1 Area of study

This paper focuses on intra-European cooperation in science for two main reasons. The first reason relates to a shared general institutional framework. Continuing integration of the European Economic Area (EEA) is well visible in the movement of goods, capital and people. All EEA citizens enjoy freedom of travel and the majority pay with a common currency. High levels of social and economic development and well-operating transport networks promote researcher and student mobility within the EEA. The second reason relates to a set of science-specific policies, regulations and instruments. The development of intra-European collaboration in science is promoted via specific EEA-wide legislation and support measures, such as Framework/Horizon Programmes, large research infrastructure, and transnational research networks (Nedeva, 2012).

3.2 Time period

The evolution of the European scientific landscape has been shaped by a high number of socio-economic events and policies. Some events have shaped the evolution of general socio-economic and political spaces in Europe. The most important events probably include:

- i. The 1995, 2004, 2007 and 2013 enlargements;
- ii. The introduction of free movement within the Schengen area in 1995; and
- iii. The onset of the 2008 financial and economic crisis; and the most important science-support policies including
- iv. Creation of the European Higher Education Area (the Bologna Process) in 1999;
- v. The establishment of the European Research Council (ERC) in 2007;
- vi. The launch of the Joint Programming process in 2008;
- vii. The assistance to international collaborative research under the Framework Programmes; and
- viii. Support from the Structural and Cohesion Funds to research, technology and innovation.

Studying the evolution of co-authorship networks over a quarter of a century implies sub-dividing the long time period into two or more shorter ones. The choice is not easy, as none of the above-mentioned events worked in isolation. The impacts of these events on the European scientific landscape tend to be multiplicative and synergetic over time.

The 1995 enlargement included three small countries (Austria, Finland and Sweden). Furthermore, it is too early to evaluate its impacts in the 1993–2017 time series. The 2004, 2007 and 2013 enlargements involved 13 countries from the east and south of Europe. These countries had

Authors	Research focus	Unit of analysis	Period	Main method	Controls/explanatory variables
Breschi & Cusmano (2004)	R&D joint ventures in FP4	9,816 organisations	1994–1996	Network analysis	n.a.
Frenken et al (2009)	co-publications (WOS, BMB, EEE)	1,316 NUTS3 regions, 36 countries	1988–2004	Gravity model	physical distance, fields of science
Paci & Usai (2009)	EPO applications	175 NUTS2 regions, 17 countries	1990–1998	Gravity model	physical distance, regional dummies (same country, neighbourhood)
Hoekman et al (2010)	co-publications (WOS)	313 NUTS2 regions in 33 European countries	2000–2007	Gravity model	physical distance, regional dummies, linguistic proximity, fields of science
Abbasi et al (2011)	co-publications (SCOPUS, 15 journals)	76 countries	1970–2009	Network analysis	n.a.
Pan et al (2012)	co-publications and citation (WOS)	37,750 cities in 225 countries	2003–2010	Network analysis	R&D spending and numbers of researchers
Barber & Schergell (2013)	FP5 projects	225 EU NUTS2 regions	1998–2002	Network analysis	physical distance, regional dummies (neighbourhood, institutional distance)
Chessa et al (2013)	OECD REGPAT applications	5,552 NUTS3 regions in 50 countries	1986–2010	Network analysis	n.a.
Miguèlez & Moreno (2013)	EPO applications	269 European-NUTS2	2000–2005	Cross-section gravity models	physical distance, regional dummies (same country, neighbourhood), technological similarity
Montobbio & Sterzi (2013)	USPTO applications	18 countries of the World	1990–2004	Gravity model	physical distance, trade, technological, political and linguistic proximity
Balland et al (2013)	FP5 and FP6 projects on GNSS	360 bodies in Europe	1998–2006	Network analysis	n.a.
De Prato & Nepelski (2014)	PATSTAT applications	90 countries	1990–2007	Network analysis, gravity model	physical distance, language dummy, GDP, FDI
Morescalchi et al (2015)	OECD REGPAT applications	5,552 NUTS3 regions in 50 countries	1988–2009	Gravity model	physical distance, regional dummies - size, neighbourhood)
Wagner et al (2015)	co-publications, SCI	171–201 countries	1990, 2000, 2008, 2011	Network analysis	n.a.
Quatraro & Usai (2016)	OECD REGPAT applications and citations	276 European-NUTS2	2001–2004	Gravity model	physical distance, regional dummies (neighbourhood, institutional and cultural effects, technological distance), R&D spending, tertiary graduates
Bergé et al (2017)	EPO applications	245 EU NUTS2 regions	2006	Network analysis	n.a.
Wagner et al (2017)	co-publications (Elsevier, 6 science fields)	193 countries	2008–2013	Network analysis	fields of science
Gui et al (2018)	co-publications (WOS)	60 countries	2000–2014	Gravity model	physical distance, technological, social and linguistic proximity

Tab. 1: Literature survey, selected papers

Source: authors' survey

Notes: FP = EU Framework Programmes; SCI = Science Citation Index; WOS = Web of Science; MMB = Biochemistry and molecular biology; EEE = Electrical and electronical engineering; GNSS = Global navigation satellite system; PATSTAT = Worldwide Patent Statistical; EPO = European Patent Office; USPTO = US Patent Office; OECD REGPAT Database (EPO and PCT patents by regions)

limited scientific capacities. The benefits of the Schengen and Bologna Processes are spread out over time, and it is difficult to tie them to specific years. The 2008 economic crisis might have had an effect on some national exchange and scholarship schemes, but these were probably less important than the EU schemes, which were largely not impacted by the crisis.

The most important policies aimed at fostering international (and, specifically, intra-European) cooperation in science and technology were implemented after 2007. There was a substantial increase in funding between the Sixth Framework Programme (2002–2006; €16.3bn) and the Seventh Framework Programme (2007–2013; €53.2bn, European Commission 1994–2013). The Framework Programmes were explicitly designed to support the creation of the European Research Area (ERA).

We therefore decided to analyse the development of European scientific collaboration in two distinctive periods: 1993–2006 and 2007–2017. The collaboration patterns studied pertain to the EU28 countries, plus Switzerland and Norway (hereinafter referred to as ‘European countries’).

The data were extracted from the Web of Science Core Collection database (hereinafter referred to as ‘WOS’)¹. The database contains 47.67 million entries, of which 15.65 million papers were single-authored/co-authored by at least one European scientist. The latest figure includes 4.77 million papers co-authored by at least two partners from the European countries in the period 1993–2017².

3.3 Variables

Country pairs are the unit of analysis for the co-authorship patterns. The dependent variable is expressed as

$$\frac{cp_{ij}}{\sum_j^{29} Ecp_i}$$

where $i \neq j; i = 1...30; j = 1...29$.

The numerator concerns the number of co-publications of country i with country j and the denominator relates to the total number of co-publications of country i with all European countries (‘European co-publications’). The explanatory variables are expressed in a similar way. The variable for the merchandise exports, for example, is expressed as

$$\frac{me_{ij}}{\sum_j^{29} Eme_i}$$

where $i \neq j; i = 1...30; i = 1...29$.

The choice of explanatory variables is based on different types of connectivity. The sample structure implied a preference for a relatively low number of explanatory variables. We did analyse, however, a high number of connectivity-type variables. The eight independent variables showing the highest correlations with the dependent variable were selected.³

Firstly, we include three indicators of international trade in knowledge: patents with foreign co-inventors, as a measure of mutual research cooperation (variable 1); foreign ownership of domestic inventions (variable 2); and domestic ownership of foreign inventions (variable 3). All variables are measured via shares of the j -th European patenting partner in total joint European patents by the i -th European country. Cooperation on patents frequently is accompanied by published joint scientific papers. Data on trade in patents were extracted from the OECD Patent Database (OECD, 2019);

Secondly, international merchandise trade is measured via shares of the j -th European trading partner in total European merchandise imports and exports by the i -th European country (variables 4 and 5). We assume that international trade is strongly related to international community gatherings, international business travel, and transnational network relations. Some current trade flows refer to previous cooperation in science and technology. Data on merchandise trade were extracted from the UNCTAD database (UNCTAD, 2019); and

Thirdly, human mobility was approximated via three variables. The share of the j -th European destination in total emigrants from the i -th European country of origin (variable 6) is a proxy for long-term human mobility. The share of the i -th European student destination in total tertiary students originating from the i -th European country (variable 7) approximates human exchange in higher education and research. The share of nights spent by tourists from the i -th European country in nights spent by all European tourists in the i -th European country (variable 8) approximates short-term human mobility, including mobility by businessmen and researchers. Variables 6, 7 and 8 are proxies for face-to-face contact, building foreign experience and trust and transferring tacit knowledge. Data on migration exchange and tourist exchange were extracted from the Eurostat database. The OECD database on foreign and international students and the Eurostat database were sources of data on international students.

Data for the dependent variable have been available for 30 European countries from 1993 to 2017. Data for independent variables have been available from 1993 to 1998, depending on the variable type. Descriptive statistics for the dependent and independent variables are presented as an Appendix 1 (see below).

3.4 Analytical methods

The unit of analysis and the availability of data have impacts upon the choice of analytical methods. Traditional gravity models suffer from some pitfalls, in that they allow for no missing data and/or zero exchanges. Regression methods assume the independence of explanatory variables. These assumptions are often difficult to meet. In World trade models, for example, one third to one half of countries do not trade with one another or trade only in one direction (Helpman et al., 2008, p. 447). A substantial part of the bilateral trade matrices is missing (Haveman

¹ Papers by German authors, for example, were most frequently co-authored by partners from the UK (16.9%) and France (11.5%) in the period 1993–2017

² The download option does not enable recording the numbers of cooperating authors. A paper co-authored by three Dutch authors and one French author, for example, is reported as one Dutch–French cooperation

³ Note: We examined alternative variables, such as road distance. These variables produced low communalities (below 0.2) and were therefore excluded from further analysis

and Hummels, 2004, p. 211). The problem of missing or zero values applies also to explanatory variables. Moreover, the gravity model results may be difficult to interpret, due to questions regarding data completeness and other influencing factors (Ramos, 2016).

All explanatory variables in our model were strongly correlated. Most Pearson correlation coefficients were higher than 0.7 (see the Appendix 2 below). Hence, multicollinearity problems arise.

We considered strong assumptions with respect to missing data, zero flows, and multicollinearity. We opted for an approach alternative to the gravity model: we applied factor analysis in order to reduce the number of explanatory variables and mitigate the multicollinearity risk. This approach enables integrating multiple explanatory variables into meaningful factors (“connectivities”), which are easier to interpret from the perspectives of economic geography.

4. Connectivities: Determinants of the network’s configuration

Factor analysis is often used to reduce the large number of variables to a smaller number of factors. Factor scores are then used as inputs to a regression analysis so as to overcome the issue of multicollinearity, as they can be estimated as (truly) independent variables.

4.1 Factor analysis

Application of factor analysis is subject to some considerations, such as the sample size, numbers of factors and variables, and methods of factor extraction/ rotation. Any quantitative analysis of European co-authorship patterns must consider the sample of the European country pairs ($N = 620\text{--}870$, see Appendix 1 below). Conducting factor analysis requires meeting some specific criteria (de Winter et al., 2009). The sample size is a function of communalities, factor loadings, factor numbers and variable numbers. Communalities should be higher than 0.6, while the number of factors and variables should be low. Indicators of sampling adequacy must be above certain thresholds: the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy should exceed 0.7. We checked the above-mentioned recommendations on communalities, KMO statistics, and factor and variable numbers. All communalities obtained in

the analysis were above 0.7. The KMO statistics were close to 0.9 (Tab. 2) in both periods.

The connectivities in merchandise trade, knowledge trade and human exchange are mutually correlated. Oblique rotation should be preferred to orthogonal rotation in confirmatory factor analysis (CFA) in the case of interrelated factors (Osborne, 2015, p. 5). In most cases, oblique rotation provides a more realistic representation of how factors are interrelated (Brown, 2014, p. 28; Costello and Osborne, 2005, p. 5).

The pattern matrix is examined for factor loadings using oblique rotation methods. Three factors were detected (see Tab. 2):

- Factor 1 – Trade in knowledge (variables 1 to 3);
- Factor 2 – Trade in goods (variables 4 and 5);
- Factor 3 – Human exchange (variables 6 to 8).

All three factors had high pattern matrix loadings on expected variables. Three factors explained 83.054% of the total common variance in the period 1993–2006 and 83.047% in the period 2007–2017.

4.2 Regression analysis

Anderson–Rubin factor scores were produced in the factor analysis. The method allows factor scores to be uncorrelated (DiStefano et al., 2009, p. 5). We checked for the correlation of all three factor scores: all correlation coefficients were lower than 0.265. Anderson–Rubin factor scores for Factors 1, 2 and 3 were used as independent variables in the OLS regression model (Tab. 3). The adjusted R-squared was 0.757 for the period 1993–2006 and 0.719 for the period 2007–2017. All variables had expected (positive) signs: i.e. the higher the partner share in trade in patents and goods and human exchange, the higher the partner share in European co-publications.

The strength of the effect of each independent variable on the dependent variable can be measured via the standardised beta coefficient (Beta). Factor 1 – Trade in knowledge (variables 1 to 3) accounted for the highest Beta coefficients and significance levels in both periods. Factor 2 – Trade in goods (variables 4 and 5) accounted for the second-highest, and Factor 3 – Human exchange (variables 6 to 8) for the third-highest Beta coefficients and significance levels in both periods.

	1993–2006			2007–2017		
	F1	F2	F3	F1	F2	F3
Percent of variance explained	67.81	10.90	4.35	65.15	8.44	9.46
Domestic ownership of inventions made abroad	0.811	– 0.051	0.162	0.974	– 0.078	– 0.057
Patents with foreign co-inventor(s)	0.895	0.132	– 0.003	0.860	0.100	0.080
Foreign ownership of domestic inventions	0.377	0.478	0.024	0.509	0.286	0.102
Merchandise exports	– 0.009	0.873	0.114	0.040	0.837	0.074
Merchandise imports	0.049	0.852	0.070	– 0.008	1.024	– 0.039
Migration exchange	0.026	0.042	0.860	– 0.040	0.029	0.910
Student exchange	0.130	0.095	0.708	0.007	– 0.071	0.945
Nights spent	0.066	0.112	0.695	0.114	0.208	0.596

Tab. 2: Confirmatory Factor Analysis, pattern matrix (Notes: Kaiser-Meyer-Olkin Measure of Sampling Adequacy: 0.898 for 1993–2006 and 0.856 for 2007–2017. The oblique rotation produces pattern matrix. In the pattern matrix, loadings on specific factors are regression coefficients. Pattern loadings can fall beyond range $[-1, 1]$)

Source: authors’ computations

	1993–2006					2007–2017				
	B	Std. Err	Beta	t	sig	B	Std. Err	Beta	T	sig
constant	4.824	0.176		27.335	0.000	4.141	0.117		35.490	0.000
Factor 1	4.548	0.204	0.695	22.244	0.000	2.543	0.109	0.612	23.225	0.000
Factor 2	1.685	0.137	0.372	12.320	0.000	1.367	0.090	0.396	15.125	0.000
Factor 3	1.070	0.139	0.241	7.697	0.000	1.130	0.092	0.323	12.312	0.000
	R2 = 0.872; Adjusted R2 = 0.757					R2 = 0.849; Adjusted R2 = 0.719				

Tab. 3: Linear regression with the factor scores
Source: authors' computations

The findings of the regression analysis confirm Hypothesis 1: long-term connectivities in trade in goods and knowledge, as well as human mobility, explain a substantial proportion of the European patterns of co-authorship. The Beta value for the trade in knowledge (Factor 1) somewhat decreased between the two periods, but remained the strongest predictor of co-authorship patterns. The Beta values for merchandise trade and human mobility increased over the two periods. Interestingly, human mobility (Factor 3) accounted for the highest increase in Beta value (Hypothesis 2). The increase in Beta for Factor 3 may reflect the EU's 2004, 2007 and 2013 enlargements. Such an increase in Beta value corresponds to an increase in intra-European human exchange. The absolute volume of intra-European migrants, for example, increased 2.69 times, while the nominal value of exports increased only 1.35 times between 2006 and 2017.

5. Geographical patterns of European co-authorship

To date we have identified some factors (connectivities) that are important for configurations of knowledge transfers over distance. Some factors increased while some decreased in importance for the overall configuration of co-authorship networks. Have these changes resulted in any significant reconfiguration of the co-authorship network?

We examine the patterns of scientific cooperation between the 28 EU member countries, Switzerland and Norway. The analysis starts in 1993, wherein all of the above-mentioned countries already existed and papers co-authored by their nationals were reported in the WOS database⁴. We therefore analyse the development of the same network over 25 years.

5.1 Co-authorship modules

The spatial configuration of European scientific cooperation (and its changes over time), is examined first of all via standard network measures such as the average weighted degree (Easley and Kleinberg, 2010). There was a substantial increase in the intensity of cooperation. The average weighted degree increased from 5,806.13 from 1993–2006 to 22,771.67 from 2007–2017. Shares of co-publications by scientists from at least two European countries, Norway and Switzerland, in relation to total scientific output, increased from 27.1% in the period 1993–2006 to 34.9% in the period 2007–2017. Small countries with open economies, well-diversified research

systems and a high intensity of public support with respect to research, were the main beneficiaries of international cooperation. Co-authorship shares, for example, increased much more for Belgium, Denmark and Finland than for Greece, Portugal and/or Slovakia. The considerable increase in intensity of cooperation, however, did not result in any substantial changes in the network structure. The basic topology of the European co-authorship network remained remarkably stable. This finding supports Hypothesis 3 and also assumptions by the EEG on cumulative reproduction of the network structure.

The network diagrams (Fig. 1) visualise patterns of European scientific cooperation in the periods 1993–2006 and 2007–2017. The circles in the diagram (nodes) represent European countries. The connecting lines (edges) between nodes describe the number of connections and the intensity of cooperation (in terms of co-authored papers). Edge thickness corresponds to the average annual number of co-authored papers in the specific time period. The thick line between the United Kingdom (UK) and Germany (DE), for example, represents 4,096 papers co-authored by German and British scientists annually in the period 1993–2006, which is, by far, the largest cooperation link (Fig. 1). Node sizes reflect the intensity of cooperation between specific countries. The degree of a node (country) is a simple number of connections with other nodes (countries). The degrees of nodes are weighted by the edge thickness (intensity of cooperation). The UK and Germany accounted for the highest numbers of co-authored papers, and the respective nodes for these countries are the largest circles in the network diagram. We used the Fruchterman-Reingold (FR) layout algorithm to visualise the nodes and edges in a web (Fig. 1)⁵.

Complex graphs tend to be divided into distinctive modules (communities). Modules are “densely connected groups of nodes with only sparser connections between groups” (Newman, 2006, p. 6). Seven communities were detected in the periods 1993–2006 and 2007–2017:

1. North West (United Kingdom, Netherlands, Belgium, Luxembourg and Ireland);
2. Central Europe (Germany, Austria, Switzerland, and some new member countries, notably the Czech Republic, Hungary, Poland and Croatia);
3. Scandinavia (Denmark, Norway, Sweden and Finland, and Estonia, Latvia and Lithuania);
4. Iberia (Spain and Portugal);
5. Italy and France;

⁴ The Czech and Slovak Republics were established as independent nations on 1st January 1993

⁵ The FR algorithm belongs to a family of force-directed layout algorithms. Nodes are repositioned until they stabilise when the energy of the system is minimised and the system reaches an equilibrium state (Fruchterman and Reingold, 1991)

6. South East / Balkans (Greece, Cyprus, Romania and Bulgaria); and
7. Slovakia and Slovenia.

Specific communities seem to mirror patterns of geographical, cultural and linguistic proximities. The proximities lowered barriers to the transfer of encultured tacit knowledge, and enhanced cooperation between research partners. The communities also correspond to the traditional, albeit changing, spheres of influence of the major European powers in terms of policy, trade and culture (Moravcsik, 1991).

Communities (1)–(4) remained stable in the two periods compared. Loosening ties between Italy and France and the emergence of separate communities for these countries, were major changes in the community structure between the periods 1993–2006 and 2007–2017. France developed more ties with Romania, Poland and Luxembourg. The Czech Republic and Slovakia formed a new community: this community no doubt operated on shared historical legacies, and physical, organisational and social proximity. Croatia,

Slovenia and, rather surprisingly, Latvia, Lithuania and Estonia had cooperated more with the South East/Balkan community. The whole South/East community appears to be connected to Italy. It should, however, be noted that all members of the South and East communities (except for Italy), as well as Slovakia and Slovenia, account for low publication intensity compared to advanced EU member countries. A relatively small increase in publication intensity and diversification of international collaboration is reflected in the regrouping of community members. Hoekman et al. (2010) found that researchers from the European periphery were more likely to collaborate with international partners than were researchers in countries of the European core. This is understandable, as researchers in peripheral countries are less likely to benefit from high-quality research infrastructure. Furthermore, they have more limited choices of partners in their own countries and fields of research. The finding supports assumptions by the EEG on preferential attachment: new entrants to co-authorship networks preferred to connect to well-connected influential partners in Europe's core.

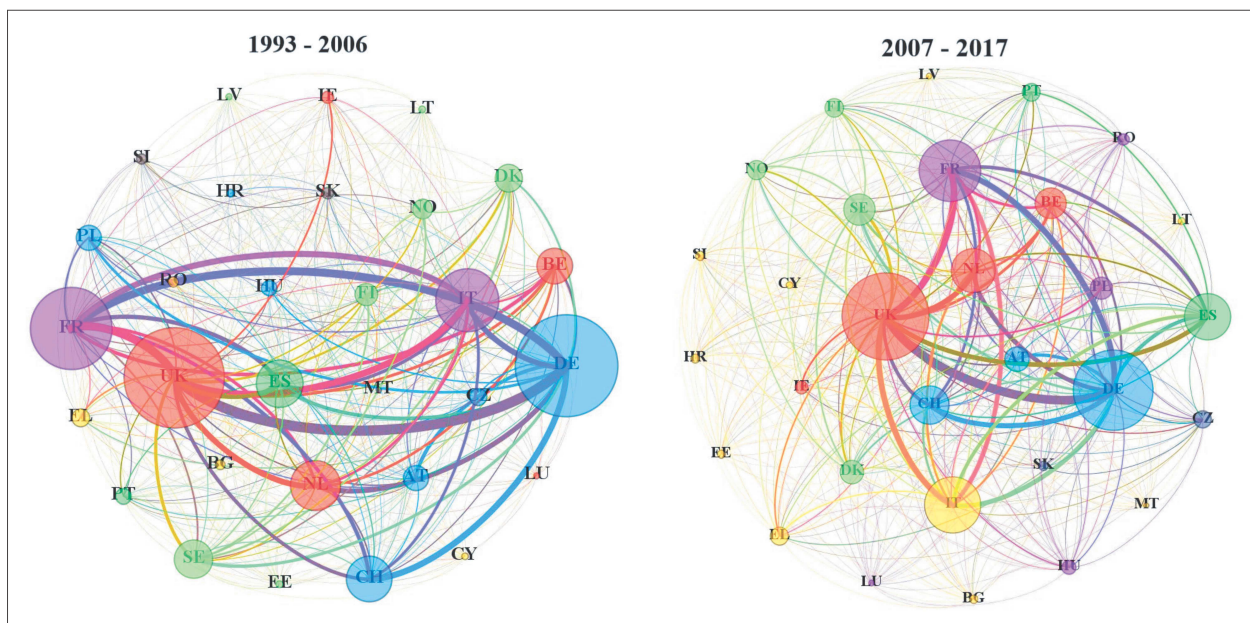


Fig. 1: The network diagram for patterns of European scientific cooperation in the periods 1993–2006 and 2007–2017
Source: authors' elaboration

5.2 Rich club and core-periphery

Complex networks may have very different architecture. In some networks, relatively few influential nodes are strongly interconnected, and the 'rich' nodes are much more likely to form tight and well-interconnected cliques (clubs) than are low-degree nodes (Colliza et al., 2006, p. 110). In a weighted network, the 'rich club' is a phenomenon wherein some prominent nodes direct their strongest ties towards one another to a greater extent than randomly expected (Opsahl et al., 2008). Traffic between members of the 'rich club' accounts for a substantial proportion of total traffic in the network. The influential nodes also collect high numbers of connections with peripheral nodes.

Traffic between peripheral nodes, on the other hand, is quite weak. 'Rich club' architecture is typical for air traffic systems with major hubs, Internet networks and/or tourist exchange. Examples of the rich club in weighted networks include the global trade network (Zlatic et al., 2009), airline

networks (Barrat et al., 2004; Opsahl et al., 2008) or mobility patterns with respect to the Chinese population during national holidays (Wei et al., 2018).

As for scientific publications, the European 'rich club' consists of the UK, Germany, France, Italy, the Netherlands, Spain and Switzerland. The above-mentioned seven countries generated 95.4% of European papers (single-authored and co-authored) in 1993. The respective share of the rich club had decreased to 86.5% by 2017, but the decrease was slightly accelerated after the 2004 eastern enlargement of the EU. Some EU members deriving from the 2004, 2007 and 2013 enlargements increased their publication intensity by as much as ten-fold in the above-mentioned period. Moreover, they were more likely to co-author their papers with other members of the periphery, outside of the 'rich club'. Shares of single-authored and co-authored papers by new EU member countries out of the total number of European papers increased from 6.1%

to 14.2% in the period 1993–2017⁶. The basic structure of the co-authorship network, however, remained dominated by the rich club of seven countries. The persistence of the ‘rich club’ confirms Hypothesis 3 regarding the relative stability of the geographical patterns of co-authorship. It also supports assumptions by the EEG on the cumulative causation and reproduction of the network structure.

The core-periphery structure of international collaboration patterns is by no means restricted to Europe. De Prato and Nepelski (2014) used data from the European Patent Office (EPO) and the Worldwide Patent Statistical Database (PATSTAT) to map the global technological collaboration network. They found the network to be dominated by major global powers: USA, UK, China, France and Japan. These few hubs were complemented by a high number of peripheral countries. The structure of the collaboration was determined by linguistic proximity and spatial proximity. The hierarchical structure of international scientific collaboration patterns is well visible also at regional levels: Bergé et al. (2017) examined the European co-patent network in order to analyse cooperation in R&D at the NUTS 2 level, finding that a relatively small number of German, French, Swiss and Belgian regions played key roles in international co-patents. The centre-periphery and ‘rich club’ patterns were also detected at similar regional levels in Europe (Breschi and Cumano, 2004).

6. Discussion, conclusions and directions for further research

This paper contributes to the literature on international cooperation in science and technology. It uses propositions of the EEG to explain the evolution of the European co-authorship network over a turbulent period of political and economic changes in Europe in the period 1993 to 2017. The paper combines the theoretical assumptions by the EEG with extensive quantitative analysis to identify major factors of the network architecture and changes in the network structure over time.

The EU’s common economic, cultural and political spaces (‘connectivities’) were extremely important for building European co-authorship networks. Promotion of the four freedoms of the single market, joint research programmes, as well as innovations in international travel, vastly increased the intensity of co-authorship between the periods 1993–2006 and 2007–2017. Even so, all of these changes seem to have had a limited impact on the geography of cooperation. The geographical modules of co-authorship are path-dependent and build upon sets of historical connectivities in trade, knowledge and human exchange. As for the geography of cooperation, shared historical legacies and connectivities remained as important as ever. It is not only geographic distance but also cultural and linguistic borders which impact on the cooperation between scientists. Crossing borders sometimes means entering different cultures and languages. As long as scientific research is conducted by human beings, geographical, cultural and linguistic proximities will remain important determinants of international cooperation in science (Hypothesis 1).

The EEG underlines the importance of cognitive, organisational, and social proximity for building networks of knowledge exchange (Boschma, 2005). The regression analysis in this project found a strong and increasing

importance of human exchange for explaining co-authorship patterns in the period 2007–2017 compared to 1993–2006 (Hypothesis 2). The importance of human exchange for forming co-authorship ties is at a high level and growing over time. The rise of web-based communication may have greatly sped up the diffusion of codified knowledge, e.g. in terms of papers or patents. Tacit knowledge, however, is no less important for scientific work than before the age of the Web. Human exchange is essential for building relational assets (Essletzbichler and Rigby, 2007). There remains a need for face-to-face communication in order to transmit complex knowledge, be it embedded routines or embodied competences acquired by a person through experience (Bathelt and Henn, 2014). Disseminating tacit knowledge requires informal social interactions and arm’s-length market-based relationships.

The network analysis pointed to: (a) a distinctive core-periphery structure; and (b) considerable stability in the European co-authorship network over a quarter of a century. The centre was identical with a cluster of seven countries (the ‘rich club’), while small and/or less developed EEA members formed the periphery. The 2004, 2007 and 2013 EU enlargements was manifested in a subsequent increase in the share of new members in total European publication output. The new members followed trajectories of preferential attachment, as all of them developed connections with influential research partners from the EU15 countries. Over time, some new members formed specific cooperation communities within the periphery, as seen in the formation of such communities following shared historical legacies and cognitive, organisational and social proximity (e.g. the Czech and Slovak communities, or the southern European communities). The emergence of peripheral communities is an example of the mechanism of variation. The three enlargements, however, were not enough to alter processes of cumulative causation in significant ways. Patterns of core and periphery in European co-authorship networks changed little (Hypothesis 3). The dominant position of the ‘rich club’ remains unchallenged, as the position of the ‘rich club’ refers to the economic and scientific capacities of its members.

Our research has some important limitations. The findings may be affected by the choice of publication database: even though WOS has better coverage of science than of social science topics. Other limitations relate to the quality of the underlying data. Data on tourist exchange and migration exchange, for example, account for better coverage from 2007–2017 than from 1993–2006. Further research will, undoubtedly, benefit from longer time series and better data coverage.

Further research may consider the following directions. An obvious option is to extend the geographical coverage of the research. Knowledge of diffusion networks between European and neighbouring countries are weaker than those between European countries (Autant-Bernard et al., 2017), but may follow the same types of connectivities in merchandise trade, trade in knowledge, and human exchange. This paper has used co-authorship patterns as proxies for the transfer of tacit knowledge over distance. Alternative proxies (dependent variables) may include the composition of committees and boards in international organisations and multinational companies. Another option is to explore alternative connectivities (independent variables). One area worthy of investigation is that European countries follow diverse legal

⁶ Multinational co-authorship allows for total shares higher than 100% by particular countries.

systems. Comparative law studies, for example, recognise French, German and Scandinavian civil laws, as well as a number of hybrid systems. Common legal systems may induce higher trust and understanding, and decrease transaction costs amongst research partners (Felbermayr and Toubal, 2010). Research may test the hypothesis that similarities and/or differences in law systems impact upon the choice of project partners and, indirectly, co-authorship patterns.

In addition, some European countries tend to form specific regional cooperation bodies, such as the Nordic Council or the Visegrád Four Group. Some regional cooperation bodies provide research funding for regional partner scientists and institutions. Country membership in regional bodies usually originates in shared historical legacies, geographical proximities, and linguistic and cultural affinities. Such affinities manifest in many, often unexpected, patterns of cooperation, such as ‘voting alliances’ in the Eurovision Song Contest (Budzinski and Pannicke, 2017). Do ‘friend or foe’ alliances (García and Tanase, 2013) manifest only in emotion-laden song contests, or are they present in (supposedly rational) choices of research partners as well? There are some very interesting questions in these reflections.

In this paper we have concentrated on the role of general socio-economic spaces in the formation of co-authorship networks. Further research may analyse the role of science-specific support tools in forming research partnerships and in creating co-authorship networks. The Framework and Horizon Programmes were the obvious candidates in the past (Breschi and Cusmano, 2004; Barber and Scherngell, 2013). Alternative specific support tools may include supranational research projects developed under the COST, EUREKA and ERA-NET schemes, joint technology platforms, and shared research infrastructures.

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	1993–2006					2007–2017				
	N	Min	Max	Mean	Std. Dev	N	Min	Max	Mean	Std. Dev
CA	868	0.01	38.35	3.46	4.60	870	0.04	25.05	3.45	3.66
PFCI	604	0.01	62.33	4.97	8.21	664	0.01	53.85	4.52	7.40
FODI	557	0.01	57.14	5.39	8.17	620	0.01	46.37	4.84	6.96
DOIMA	557	0.01	62.08	5.39	8.84	620	0.01	57.23	4.84	8.38
ME	870	0.00	55.60	3.45	6.47	870	0.00	50.96	3.45	6.17
MI	870	0.01	42.62	3.45	6.04	870	0.01	40.05	3.45	5.68
SMCOE	697	0.00	89.31	4.30	10.61	792	0.00	85.22	3.79	9.47
ISCOE	614	0.00	90.74	4.72	10.43	718	0.00	90.25	4.18	9.43
NSET	498	0.02	79.03	5.62	9.85	727	0.00	68.04	4.13	8.19

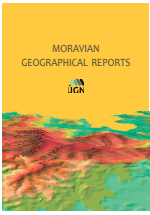
Appendix 1: Descriptive statistics

Notes: CA = co-authorships (Source: Web of Science Core Collection database (2019), time series available since 1993); PFCI = Patents with foreign co-inventor(s); FODI = Foreign ownership of domestic inventions; DOFI = Domestic ownership of foreign inventions (Source: OECD.Stat, 2019: International co-operation in patents; all time series available since 1993); ME = Shares of each European trading partner in total European merchandise exports by country of origin; MI = Shares of each European trading partner in total European merchandise imports by country of origin (Source: UNCTAD, 2019: International trade in goods and services; Merchandise: Total trade and share, annual; time series available since 1995); SMCOE = Share of European migrants from a country of origin in all European destinations (Source: Eurostat, 2019: Population on 1st January by age group, sex and citizenship – Country of citizenship; time series available since 1998); ISCOE = Share of international students from a country of origin in all European student destinations (Source: OECD.Stat, 2019: Foreign / international students enrolled (to 2012), and enrolment of international students by origin (from 2013); time series available since 1998); NSET = Share of nights spent by European partner tourists in partner countries (Source: Eurostat, 2019: Number of nights spent by country / world region of destination; time series available since 1994)

1993-2006	CA	PFCI	FODI	DOIMA	ME	MI	SMCOE	ISCOE	NSET
CA	1	0.823**	0.761**	0.720**	0.829**	0.828**	0.741**	0.836**	0.743**
PFCI	0.823**	1	0.791**	0.894**	0.804**	0.810**	0.744**	0.770**	0.709**
FODI	0.761**	0.791**	1	0.671**	0.760**	0.760**	0.635**	0.675**	0.646**
DOIMA	0.720**	0.894**	0.671**	1	0.694**	0.706**	0.702**	0.677**	0.702**
ME	0.829**	0.804**	0.760**	0.694**	1	0.907**	0.744**	0.757**	0.696**
MI	0.828**	0.810**	0.760**	0.706**	0.907**	1	0.730**	0.727**	0.713**
SMCOE	0.741**	0.744**	0.635**	0.702**	0.744**	0.730**	1	0.815**	0.756**
ISCOE	0.836**	0.770**	0.675**	0.677**	0.757**	0.727**	0.815**	1	0.750**
NSET	0.743**	0.709**	0.646**	0.702**	0.696**	0.713**	0.756**	0.750**	1
2007-2017	CA	PFCI	FODI	DOIMA	ME	MI	SMCOE	ISCOE	NSET
CA	1	0.773**	0.763**	0.577**	0.766**	0.788**	0.691**	0.749**	0.709**
PFCI	0.773**	1	0.820**	0.860**	0.787**	0.808**	0.679**	0.670**	0.739**
FODI	0.763**	0.820**	1	0.604**	0.717**	0.740**	0.579**	0.611**	0.630**
DOIMA	0.577**	0.860**	0.604**	1	0.621**	0.619**	0.527**	0.457**	0.637**
ME	0.766**	0.787**	0.717**	0.621**	1	0.910**	0.650**	0.619**	0.721**
MI	0.788**	0.808**	0.740**	0.619**	0.910**	1	0.648**	0.608**	0.716**
SMCOE	0.691**	0.679**	0.579**	0.527**	0.650**	0.648**	1	0.807**	0.765**
ISCOE	0.749**	0.670**	0.611**	0.457**	0.619**	0.608**	0.807**	1	0.727**
NSET	0.709**	0.739**	0.630**	0.637**	0.721**	0.716**	0.765**	0.727**	1

Appendix 2: Correlation matrices for dependent and independent variables

*Notes: ** Correlation is significant at the 0.01 level (2-tailed)*



Commuting pays off: Evidence on wage returns to inter-urban and intra-urban commuting

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Abstract

The distance a person is willing to commute has a direct influence on her/his employment opportunities and wage level. It raises a lot of interesting questions, especially whether intra-urban commuting (due to a well-developed transport infrastructure, geographical concentration of job opportunities, etc.) is connected with any wage returns, and how they differ in comparison with those of inter-urban commuting. This article uses three data-sets at national ($N_1 = 1,884$; $N_2 = 933$) and local ($N_3 = 3,193$) levels from the Czech Republic, and different approximations of commuting in order to contribute to the discussion. It provides robust evidence on positive wage returns to both inter-urban and intra-urban commuting, comparable with Western countries. The differences between large national and limited urban labour markets are reflected in functional form: wage returns are linear for intra-urban and non-linear for inter-urban commuting. The article also explores the validity of different measures of commuting time and distance provided by the on-line application *Mapy.cz*, and suggests that it represents a suitable approximation in the case of missing or limited data.

Key words: commuting, wage returns, job search, urban environment, transport infrastructure, Czech Republic

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1. Introduction

Migration (i.e. residence relocation) and commuting represent spatially-related coping strategies of individuals adjusting to disequilibria in the labour market (Termote, 1980), by overcoming geographical distance between residence and work place. Although they are similar in principle, they differ especially in relation to an individual's place of living, their periodicity, and often also the propensity to overcome distance. If the labour market attainable by commuting, i.e. "a repetitive daily trip from a fixed home location to a fixed work location" (Johnston et al., 2009), provides many job opportunities, an individual is motivated not to move out.

A significant lack of job opportunities, however, makes her/him look for employment in a distant labour market, which is usually connected with a permanent or temporary migration, i.e. changing her/his place of living. These factors suggest a substitution relationship between commuting and migration, as the accessibility of labour opportunities through commuting reduces the need for migration, but also relocation within a local labour market can reduce the distance of commuting. On the other hand, migration is always complemented by commuting to overcome the total distance between the original place of living and new

workplace, which points to an ambiguous relationship between these two strategies. As a change in place of living occurs occasionally, in comparison with commuting to work on daily basis, and is usually strongly affected by non-work-related factors, this article limits itself to commuting rather than the trade-offs in migration.

Commuting, or more precisely the willingness to commute, represents a very important factor in an individual's employment and income level, as it directly influences the geographical size of her/his labour market. On one hand, it presents more job offers with a broader wage dispersion (see Stigler, 1961) available to an individual, but on the other hand it brings additional costs connected with commuting. Therefore, an individual is more likely to accept only those job offers providing her/him a wage high enough to cover all financial and non-financial costs of commuting, which is reflected by the positive correlation between wage level and commuting.

It is possible to distinguish intra-urban and inter-urban commuting depending on whether a worker crosses the hometown border on her/his way to work. More than half (53.1%) of employees live and work in the same town in the Czech Republic, compared to 46.9% of those commuting

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outside their hometown (see Appendix 1A). The share of intra-urban commuting is even higher in large cities. For instance, 88.9% of employees in Ostrava, i.e. the third largest city in the Czech Republic, do not commute outside the city (see Appendix 1B). It can be noted that the apparent differences in transport infrastructure and services inside and outside urban areas may significantly affect the level of financial and mental costs of commuting and corresponding wage levels.

This article employs two representative data-sets from the Czech Republic ($N = 1,884$) and Ostrava city ($N = 3,193$) in order to:

- a. provide new evidence on the wage returns to commuting in this Central European country; and
- b. discuss the impact of transport infrastructure and the geographical size of the labour market on differences in wage returns to inter-urban and intra-urban commuting.

A third data-set ($N = 933$), using different approximations of commuting time and distance, is used for checking the robustness of the results.

There are several reasons contributing to the importance of this topic. First, there is a substantial empirical body of evidence on positive wage returns to commuting in Western Europe and the United States, but the topic is understudied in East Central Europe. This article represents a contribution to this issue by estimating wage returns to commuting in the Czech Republic and comparing them with returns in Western countries. Second, there is the question whether wage returns even exist for intra-urban commuting, as the commuting distances are usually smaller within the city and urban transport infrastructure is more developed and thus effective. Therefore, the article estimates wage returns to intra-urban and inter-urban commuting separately and compares them. Testing for the functional form of wage returns to commuting reveals significant differences between intra-urban and inter-urban commuting. Third, employing three different data-sets makes it possible to examine commuting from different perspectives and provides a robust and detailed picture on returns to commuting in the Czech Republic. Fourth, two data-sets use data from the on-line application *Mapy.cz* as an approximation of commuting time and distance. The comparison of results based on both approximated and real data suggests that data from the application *Mapy.cz* represents a valid approximation of commuting in the case of missing or limited data.

These aims have been worked out over several sections. The next section provides an overview of empirical evidence on the relationship between commuting and wage level. There follows a description of the data and models employed in this work. The last section is devoted to discussions on the wage returns to inter-urban and intra-urban commuting to work and the factors affecting them.

2. Empirical evidence on wage returns to commuting

Commuting to work, as a part of everyday life, strongly affects the quality of workers' lives as it is connected with higher levels of stress (Haider et al., 2013; Higgins et al., 2018; Sposato et al., 2012), lower work performance (Kluger, 1998) and lower life satisfaction (Choi et al., 2013; Nie and Sousa-Poza, 2018; Stutzer and Frey, 2008). On the other hand, a longer commuting distance is often compensated for by lower costs and a higher standard of housing (Plaut, 2006;

Renkow and Hoover, 2000; Sandow and Westin, 2010) and higher wages (e.g. Morris and Zhou, 2018; Mulalic et al., 2014; Ross and Zenou, 2008).

The positive relationship between commuting distance and wage level can be explained, in accordance with the theory of information (Stigler, 1961), by the higher probability of finding a better paid job by extending the relevant labour market catchment area. At the present, there is extensive empirical evidence on wage returns to commuting in the United States and other developed countries. For instance, Morris and Zhou (2018) quantified wage returns to an hour-long commute in USA at the level of 7.5%, which confirms the 8.2% wage premium identified for blue-collar workers by Ross and Zenou (2008). Similar results were found also for smaller areas with more developed transport infrastructure, where commuting is more efficient and thus less costly. Timothy and Wheaton (2001) showed that wages vary within US metropolitan areas by up to 15% and that this variation correlates with commuting.

The results for European countries are similar. A wage premium for an hour-long commute reaches the level of 7–9% there (Manning, 2003). Gerlach and Stephan (1992) found positive influences of longer commutes on wage levels in Germany, especially in the case of married women (although it has no effect on regional wage disparities, as Niebuhr et al., 2012 showed). This positive relationship was confirmed also for Dutch women (Rouwendaal, 1999), where the trade-off between commuting distance and female wages was quantified at the level of 0.12 NLG per kilometre. Laird (2006) provided evidence on positive wage returns to commuting in Scotland, but he pointed out that an increase in an individual's wage level covers her/his commuting costs only partially. Mulalic et al. (2014) examined wage changes connected with company relocation in Denmark: they showed that a one kilometre increase in commuting distance caused by the relocation, had very little effect on wages after one year, but led to 0.15% wage increase after three years. Ekberg and Widegreen (2019), who analysed the gender pay gap in 71 Swedish local labour markets, identified both longer commuting distance and higher wages in the case of men at the level of the whole economy, especially for particular economic sectors and professional groups.

Evidence on the relationship between wage level and commuting is much more limited for Central and Eastern European countries, however. For instance, Hazans (2004) showed that commuting decreases wage differences between the capital and rest of the country in Estonia and Latvia, but not Lithuania. Evidence from Hungary suggests that wages in areas with high unemployment do not compensate for the costs of commuting (Bartus, 2011), which results in the persistence of unemployment. In the Czech Republic, there is some empirical work on commuting flows and their economic consequences (e.g. Tesla and Horák, 2015; Krejčí and Toušek, 2004; Novák, 2005; Toušek and Kunc, 1999), but the estimation of wage returns to everyday commuting is missing, to the best of authors' knowledge. Studies on commuting flows can be illustrated by the work of Krejčí and Toušek (2004), for example, who analysed changes in commuting to Brno city (the second largest city in the Czech Republic) in the period 1991–2001. They pointed to a rise in the number of commuters travelling longer distances and a simultaneous decrease in commuting intensity from municipalities surrounding Brno. The share of jobs performed by commuters increased in Brno during this period as well. Novák (2005), on the other hand,

discusses the importance of economic structure, population concentration, the spatial distribution of jobs, and especially highway infrastructure for different aspects of everyday commuting. The above-stated lack of evidence on wage returns to everyday commuting in the Czech Republic is compensated for in the following sections of this article, as they discuss this important topic in detail.

3. Data and models

This article employs three data-sets on employees in the Czech Republic in order to provide rigorous and robust evidence on wage returns to commuting to work, distinguishing between the inter-urban and intra-urban cases. It should be noted that the article uses two measures of commuting, i.e. commuting distance and commuting time approximated by:

- a. geographical distance and the time necessary to overcome it based on maps and public transport schedules provided by the server *Mapy.cz* (used in data-sets examining wage returns to inter-urban and intra-urban commuting separately); and
- b. estimations provided by commuters (used for the check on robustness).

The first data source is represented by a tailor-made survey among 1,884 Czech employees aged 25–54 years, focused on wage determinants. These data provide information on the respondents' gross monthly income (in CZK), personal characteristics, education and work experience, preferences related to job, family and life roles, physiological characteristics, psychological traits, and characteristics of family background, households and workplace (hereafter, the 'national data-set'). Data were gathered through standardised face-to-face interviews conducted by the 'FOCUS – Social & Marketing Research Agency' in October and November, 2011. A quota sampling method was employed: therefore, the sample of respondents is representative for the Czech Republic on the basis of sex, age, education, region and size of municipality of residence. These data were replenished with information on some employers' characteristics (i.e. economic sector, number of employees, date of origin, ownership and legal form). For this purpose, the *Albertina Firm Monitor 4/2011* was used, as it provides the relevant information related to the time period when the survey was conducted.

The second data-set stems from a questionnaire survey on satisfaction with life in Ostrava, Czech Republic (hereafter, the 'local data-set'), conducted in February, 2016, as part of preparations of the Strategic Development Plan of the City of Ostrava for the years 2017–2023 (the questionnaire and data are available at <http://fajnova.cz>). It provides information on the respondents' gross monthly income (in three income categories), education, physical characteristics, preferences, family background and employer characteristics (other variables that are not relevant to this topic are not stated here). Data used in this article are limited only to employees aged 18–64, with permanent residence in Ostrava, who reached at least secondary vocational education (ISCED 3C/EQF 3); the sample consists of 3,193 observations. As sampling weights were applied, the sample is representative according to sex, age and educational attainment, including sub-samples based on these characteristics.

Unfortunately, neither the national nor the local data-set contains explicit information on commuting to work, such as commuting distance, commuting time or means of transport, but information is provided on place of residence and of work at the level of municipality in the case of the national data-

set, and for city districts in the case of the local data-set. Thus, it enables using dummy variables for commuting across municipality or city district borders, as well as approximating distances between municipalities and city districts through the on-line application *Mapy.cz*. The application provides three different approximations of commuting distance:

- a. the length of the shortest route between centres of municipalities/city districts (in kilometres);
- b. the time of travel by car (in minutes) to overcome it; and
- c. the time of travel by public transport on Monday 7 a.m. (in minutes).

It has to be noted that only employees commuting up to 60 minutes are considered for further analysis in the case of the national data-set in order to focus only on everyday commuters (the Czech Statistical Office, 2013 shows that 97.4% of the employed Czech population commuted not longer than 60 minutes in 2011); the length of route was limited to the distance covered by car in 60 minutes.

The third data-set stems from an on-line application *Mujplat.cz* (Tijdens and Osse, 2019), providing a wage benchmark based on information submitted by its users, including their estimation on commuting distance and time (hereafter, the 'Mujplat.cz data-set'). The sample of 933 respondents used in this paper is restricted only to employees aged 25–54 years, living and working in the Czech Republic, who commute no longer than 90 minutes or 75 kilometres in one way; the data were gathered in the year 2014. Missing data on commuting time and distance lead to a further erosion of the sample to 931 and 785 observations, respectively. As sampling weights were applied, the sample is representative according to sex and age categories, including sub-samples based on these characteristics. Unfortunately, this data-set does not provide detailed information on place of residence and of work, which prevents its use for analysing wage returns to inter-urban and intra-urban commuting separately. Therefore, the *Mujplat.cz* data-set was used for checking the results, as well as the robustness and validity of commuting measures across different data-sets.

Employing three different data-sets makes it possible to examine the discussed issues from different perspectives and to consider the robustness of the results. At the same time, the data-sets represent a source of the main limitations of the study. First, the results stem from cross-section analyses, as each data-set is related to a specific year, which makes it possible to discuss correlation between wage level and commuting, but not 'causality'. Second, the lack of information on previous migration behaviours, i.e. changes in place of residence, prevent us from considering the wage returns to a combination of migration and commuting, as a strategy for overcoming geographical distance between labour force and work place (see Introduction). Therefore, the place of residence is taken as an exogenous factor here. Third, the data employed in this article enables estimation of the wage premium connected with commuting, but the lack of information on commuting costs prevents us from quantification of its net benefits. Fourth, the place of residence and work is specified at the level of municipality and city district in the case of the national and local data-sets, respectively. Information on actual addresses would increase the accuracy of the results significantly. Although it is necessary to treat these results with respect to these limitations, the findings of this article may still represent a significant contribution to the discussion on wage returns to intra-urban and inter-urban commuting and their differences.

These data-sets (see Appendix 1 for definitions and descriptive statistics of all variables) were used for an estimation of Mincer-type OLS models (in the case of the national data-set and Mujplat.cz data-set) and ordinal logit models (in the case of the local data-set), explaining ln gross monthly wage (OLS models) or gross monthly wage category (ordinal logit models) by commuting, education and work experience, physical characteristics, non-cognitive skills and life preferences, family and background characteristics, employer and job characteristics, and location (see Equation 1). It should be noted that variables approximating the particular components of the wage model differ depending on the data-set (for detailed specification of models see variables in Tabs. 1, 2 and 4).

$$\begin{array}{l} \ln \text{ gross monthly wage} \\ \text{or} \\ \text{gross monthly wage category} \end{array} = f \left(\begin{array}{l} \text{commuting to work,} \\ \text{education and work experience,} \\ \text{physical characteristics,} \\ \text{noncognitive skills and life preferences,} \\ \text{family and background characteristics,} \\ \text{employer and job characteristics,} \\ \text{location} \end{array} \right) \quad (1)$$

A high level of attention was paid to data verification and model specification. First, a check of all data-sets was performed in order to exclude observations with unrealistic (extreme) values and obvious measurement errors. Although model specification was primarily based on theoretical assumptions and empirical evidence on wage determinants, the inclusion of variables into the model was influenced also by a check for correlation between explanatory variables in order to avoid potential problem of multi-collinearity, and a check for empty and small cells in order to support model stability. All OLS models were further tested for specification errors (Ramsey RESET test and link test), multi-collinearity (VIF test), heteroscedasticity (Breusch-Pagan test) and autocorrelation (run-test). Estimations based on the national data-set embodied no violation of the OLS assumptions, but heteroscedasticity and autocorrelation were identified in models using the Mujplat.cz data-set. An appropriate method of robust standard errors (clustered by age of respondents) was applied in these cases. Ordinal logit models using the local data-set were tested for specification error (link test), multi-collinearity (VIF test) and goodness of fit: no violations of the model assumptions were found.

4. Results and discussion

4.1 Wage returns to inter-urban and intra-urban commuting

Empirical literature shows that there are many factors, such as good health, education, work experience, developed non-cognitive skills or better information on job opportunities and willingness to commute (see Balcar, 2012, for a review), that have a positive impact on workers' productivity and wages. This section presents estimations of wage returns to inter-urban commuting in the Czech Republic (using the national data-set), and intra-urban commuting in Ostrava (using the local data-set). It enables us not only to provide evidence on wage returns to commuting, but also to discuss them, considering different conditions of inter-urban and intra-urban commuting, such as the quality and thus efficiency of transport infrastructure.

Estimations of wage returns to inter-urban commuting in the Czech Republic, based on the national data-set, are presented in Table 1. Model 1 shows that employees commuting to work out of the municipality of their residence gain 5.2% higher wages, compared to their counterparts living and working in the same municipality. As information

on commuting distance within municipalities is not available, further analysis will be limited only to individuals commuting out of the municipality. Models 2–4 approximate commuting distance by three different variables:

- length of the shortest route between municipalities of residence and of work (in kilometres);
- time of travel by car (in minutes) necessary to overcome it; and
- time of travel by public transport (in minutes).

The results reveal that only time of travel by car is significantly correlated with commuters' wage level. There is a wage bonus at the level of 0.19% for each minute of commuting between municipalities of residence and work (the estimated wage bonus of 11.4% for an hour-long commute corresponds to the results of Manning, 2003, especially when potential bias connected with focusing only on inter-urban commuters is considered). Assuming that

- time and not the route length is more related to the real costs of commuting, and
- travelling by car is more efficient and thus preferred to public transport in the case of inter-urban commuting, it is no surprise that the other two approximations of commutation distance are less statistically significant, i.e. insignificant in this case.

In fact, the non-significance of the length of the route in kilometres is due to a wrong functional form, as will be shown later. The estimation of linear returns, however, to the route distance of 0.11% (statistically insignificant here) is similar to the results reported by Mulalic et al. (2014). It can be concluded that employees commuting out of the municipality of their residence earn higher wages, the level of which is positively correlated with the time spent in the car on the road to work.

Wage returns to commuting in Ostrava City, estimated using the local data-set, can be found in Table 2. Model 5 supports conclusions presented above, as it indicates that individuals commuting to work out of Ostrava have 1.6 times higher odds of belonging to a higher wage category compared with those working within Ostrava city. It means, using average marginal predictions, that commuting out of Ostrava decreases the probability of belonging to the lowest income category (up to 20,000 CZK) by – 8.2%, while it increases the probability of belonging to the highest income category (30,000 CZK and more) by 4.8%. Model 6 focuses exclusively on intra-urban commuting, i.e. employees commuting within Ostrava city. It reveals that there is no statistically significant difference in wage category between individuals living and working in the same city district and those working out of the city district of their residence. It suggests that commuting distance within and between Ostrava's districts does not need to be significantly different and crossing the administrative lines of city districts itself do not matter. Models 7–9 employ various approximations of commuting distance in order to estimate their impact on wage level for employees commuting out of the city district of their residence. In the case of Ostrava city, route length as well as travel time, for both car and public transport, were found to be statistically significant predictors of wage category. The statistical significance of all three approximations of the commuting distance, compared to the estimations based on the national data-set presented in Table 1, suggests that the urban transport infrastructure is more efficient than that for the country as a whole. The results show that the longer the commuting distance is, the higher is the probability

of belonging to the higher wage category. As there is no statistically significant difference between employees commuting inside and outside of their residential city district (see Model 6), this conclusion is generally valid for the whole population of employees working in Ostrava.

The influence of commuting distance on wage category is visualised in Figure 1. For instance, average marginal predicted probability of having gross monthly wage at the level of 30,000 CZK or more (the highest income category) is 23% for employees commuting by car for 30 minutes in one

VARIABLES	(1) ln gross monthly wage	(2) ln gross monthly wage	(3) ln gross monthly wage	(4) ln gross monthly wage
Commuting				
Commuting out of residence municipality (dummy)	0.0501*** (0.016)			
Length of the shortest route (kilometres)		0.0011 (0.001)		
Time of travel by car (minutes)			0.0019** (0.001)	
Time of travel by public transport (minutes)				0.0008 (0.001)
Education, work experience and cognitive skills				
Years of schooling	0.0242*** (0.004)	0.0336*** (0.006)	0.0336*** (0.006)	0.0312*** (0.007)
Tenure	0.0132*** (0.003)	0.0209*** (0.004)	0.0211*** (0.004)	0.0215*** (0.004)
Tenure squared	- 0.0002** (0.000)	- 0.0004*** (0.000)	- 0.0004*** (0.000)	- 0.0004** (0.000)
Other work experience	0.0070*** (0.002)	0.0110*** (0.004)	0.0110*** (0.004)	0.0097** (0.004)
Other work experience squared	- 0.0002** (0.000)	- 0.0003** (0.000)	- 0.0003** (0.000)	- 0.0003** (0.000)
Grades from math at age 15 (1 best, 5 worst)	- 0.0327*** (0.009)	- 0.0471*** (0.014)	- 0.0462*** (0.014)	- 0.0575*** (0.016)
Physical characteristics^I				
Female	- 0.1325*** (0.023)	- 0.1279*** (0.034)	- 0.1285*** (0.034)	- 0.1321*** (0.038)
Non-cognitive skills and life preferences^{II}				
Family and background characteristics^{III}				
Employer and job characteristics^{IV}				
Location^V				
Constant	8.3614*** (0.227)	8.1747*** (0.348)	8.1526*** (0.347)	8.5700*** (0.401)
Observations	1,884	852	852	732
Adj. R ²	0.524	0.520	0.522	0.479

Tab. 1: Wage returns to commuting based on the national data-set (regression coefficients reported)

Source: authors' computations

Notes: Robust standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; See Appendix 2 for full results; I – Health limitation of work performance, Difference between individual's height and average gender height, BMI, BMI2; II – Strong need to excel and be better than others, Persistence in following difficult goals, Self-esteem, Locus of control, Feeling of personal responsibility for ensuring an adequate income, Feeling of personal responsibility for ensuring everyday housework and taking care of children, Highest life priority (family, work, free time); III – Relationship status, Number of children in 5 age categories, Number of siblings, Mother tongue; IV – Number of employees, Ownership, Natural person dummy, Age of firm/institution, Prevailing economic activity (1-digit NACE), Occupation (1-digit ISCO), Field of education and job match, Workload (scheduled working hours per week), Difference in number of hours really devoted to work and official workload, Rate of subjectivity in wage system, Absenteeism, Relation with superior/manager; V – Region according to Nomenclature of Territorial Units for Statistics (NUTS 3), Residence town size, Job opportunities

VARIABLES	(5) gross monthly wage category	(6) gross monthly wage category	(7) gross monthly wage category	(8) gross monthly wage category	(9) gross monthly wage category
Commuting					
Commuting out of Ostrava (dummy)	1.571** (0.344)				
Commuting out of borough of residence (dummy)		1.114 (0.152)			
Length of the shortest route (kilometres)			1.051** (0.0248)		
Time of travel by car (minutes)				1.055*** (0.0213)	
Time of travel by public transport (minutes)					1.018*** (0.0066)
Education and potential work experience					
Years of schooling	1.485*** (0.0298)	1.497*** (0.0331)	1.528*** (0.0417)	1.531*** (0.0420)	1.533*** (0.0420)
Age 18–24 years	0.152*** (0.0619)	0.180*** (0.0761)	0.259*** (0.123)	0.257*** (0.121)	0.243*** (0.115)
Age 25–34 years	0.378*** (0.0997)	0.394*** (0.105)	0.429*** (0.136)	0.431*** (0.136)	0.427*** (0.133)
Age 35–44 years	0.906 (0.219)	0.862 (0.203)	1.007 (0.280)	1.015 (0.280)	1.023 (0.280)
Age 45–54 years	1.155 (0.249)	1.145 (0.253)	1.367 (0.352)	1.367 (0.351)	1.360 (0.347)
Age 55–64 years	baseline	baseline	baseline	baseline	baseline
Physical characteristics					
Female	0.283*** (0.0354)	0.301*** (0.0407)	0.338*** (0.0510)	0.336*** (0.0508)	0.338*** (0.0510)
Life preferences^I	yes	yes	yes	yes	yes
Family and background characteristics^{II}	yes	yes	yes	yes	yes
Employer characteristics^{III}	yes	yes	yes	yes	yes
City district	yes	yes	yes	yes	yes
Constant cut1	53.74*** (26.48)	48.69*** (26.16)	111.6*** (72.75)	148.0*** (100.6)	142.0*** (93.72)
Constant cut2	614.0*** (310.6)	638.7*** (356.3)	1,716*** (1.175)	2,292*** (1.645)	2,207*** (1.535)
Observations	3,193	2,838	2,057	2,057	2,057
Adj. McFadden R ²	0.183	0.191	0.189	0.191	0.192

Tab. 2: Wage returns to commuting based on the local data-set (odds ratios reported)

Source: authors' computations

Notes: Robust standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; See Appendix 2, Table 2B for full results; I – Highest life priority (family, work, free time), II – Cohabitation with life partner, Children in 4 age categories (dummy variables), III – Prevailing economic activity (1-digit NACE), Sector of economic activities (Private, Public, Non-profit)

direction every day, compared to 12% for those commuting only 10 minutes or 8% for non-commuters.

4.2 Non-linear returns to commuting

To date, we have confirmed that everyday commuting to work is connected with a statistically significant wage premium in the Czech Republic, regardless of whether inter-urban or intra-urban commuting is discussed. This finding

raises a new interesting question connected with the very practical aspect of commuting. What commuting distance is connected to the highest wage returns?

Answering this question requires analysing mechanisms behind the decision-making process on commuting to work. Although there are many factors influencing workers' willingness to commute, they are reflected in three fundamental commuting strategies:

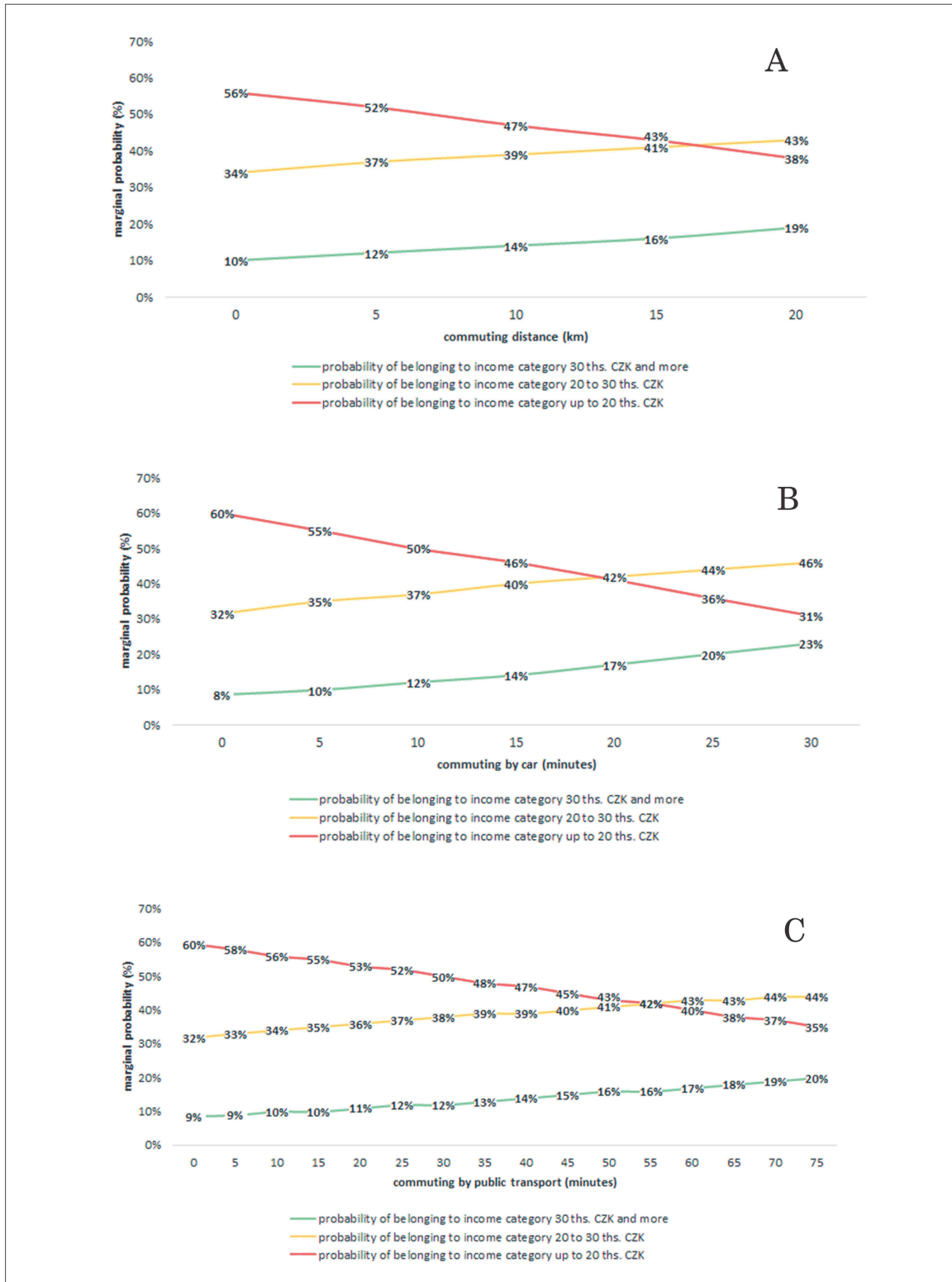


Fig. 1: Predicted probabilities of belonging into wage categories depending on commuting distance (A: Length of the shortest route – in kilometres; B: Time of travel by car – in minutes; C: Time of travel by public transport – in minutes) Source: authors' computations

- minimising commuting distance at the expense of a lower wage level;
- maximising wage level by the broadening of a search perimeter and thus considering more job offers; and
- getting a job and acquiring at least some income, in the case of a serious lack of job opportunities, even with the costs of a long commuting distance.

It can be expected that the broadening of the job-search perimeter, due to a gradual coverage of the dispersion range in job offers on the labour market, will lead to an increase of potential wages at a decreasing rate (see Stigler, 1961). It suggests that there is a perimeter size representing an imaginary frontier for optimal searching activity (given not only by a decreasing variability of job offers, but also other factors such as increasing searching costs or the spatial distribution of municipalities), and all wage-maximising decisions are taken inside this perimeter. In such a case, quantification of commuting distance providing the highest wage returns and its comparison with real commuting behaviour, will provide interesting information on commuting in the Czech Republic. Beyond the perimeter frontier, commuting provides non-maximal wage returns, which may be still accepted by workers facing a lack of job opportunities. These mechanisms suggest that the relationship between wage level and commuting distance may be non-linear.

Firstly, the non-linearity of wage returns to commuting was tested for inter-urban commuting in the Czech Republic, i.e. using a sub-sample of employees living and working in different municipalities. The linear form of the three approximations of commuting distance in Models 2–4 in Table 1 were replaced by their quadratic forms and

re-estimated (see Models 2A–4A in Tab. 3). The results support the hypothesis on non-linearity between inter-urban commuting distance and wage level. Both linear and quadratic terms of the length of the shortest route (in kilometres) and time of travel by car (in minutes) was found to be highly statistically significant (compare Models 2–3 with 2A–3A). On the other hand, time of travel by public transport remains statistically insignificant. Estimations of Models 2A and 3A show that wage returns to commuting increase up to a distance of 35.1 kilometres or 31.5 minutes by car, where they reach level of 11.6% and 16.6% respectively. The real commuting distances, however, are significantly shorter as the sample mean reaches 17.5 km (standard deviation: 13.5) and 18.5 minutes by car (standard deviation: 11.0). This discrepancy may be ascribed to commuting costs, which can be easily illustrated. The everyday commuting of 35.1 kilometres in one way, i.e. the total distance of 1,474 km per month (35.1 km in one-way \times 2 for return journey \times 21 working days per month), was connected with a monthly wage bonus of 2,261 CZK in 2011 (based on re-estimation of Model 2A with income in CZK as a dependent variable: regression coefficient of the linear term of the length of the shortest route in km reached the value of 136.02, $P = 0.003$ and quadratic term $- 2.04$, $P = 0.006$; the estimation is not shown here). It means that the commuting costs would be fully covered by this wage premium only if they did not exceed the level of 1.53 CZK per kilometre. As the wage returns to commuting grow at a decreasing rate, the shorter distance is connected with higher coverage of commuting costs. For instance, a commuting distance of 21 km is connected with a wage premium of 2.2 CZK per kilometre, which perfectly fits the costs of unleaded petrol in 2011 (consumption of 7

VARIABLES	Czech Republic the national data-set regression coefficients of OLS models			Ostrava (the local data-set) odds ratio of ordered logit models		
	(2A) ln gross monthly wage	(3A) ln gross monthly wage	(4A) ln gross monthly wage	(7A) gross monthly wage category	(8A) gross monthly wage category	(9A) gross monthly wage category
Commuting						
Length of the shortest route (km)	0.0066*** (0.002)			1.043 (0.0846)		
Length of the shortest route squared	- 0.0001*** (0.000)			1.000 (0.0038)		
Time of travel by car (min)		0.0106*** (0.003)		1.080 (0.0833)		
Time of travel by car squared		- 0.0002*** (0.000)		0.999 (0.0027)		
Time of travel by public transport (min)			0.0010 (0.003)			1.047* (0.0248)
Time of travel by public transport squared			- 0.0000 (0.000)			1.000 (0.0003)
Other control variables as in original model	Model 2	Model 3	Model 4	Model 7	Model 8	Model 9
Observations	852	852	732	2,057	2,057	2,057
Adj. R ²	0.525	0.527	0.478			
Adj. McFadden R ²				0.189	0.191	0.192

Tab. 3: Non-linear relationships between commuting and gross monthly wage

Source: authors' computations

Notes: Robust standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

litres of fuel per 100 km is assumed), but still do not cover other commuting costs, such as value of time, car wear, etc. It suggests that ‘real’ commuting behaviour represents a compromise between economically rational preference of short commuting distance and the need to find suitable employment.

As a second note, the non-linearity of the relationship between commuting distance and wage level was tested also for intra-urban commuting within Ostrava City, i.e. using a sub-sample of employees living and working in different city districts. The quadratic terms in all three models (Models 7A–9A in Tab. 3), however, were found to be statistically insignificant, suggesting that the examined relationship is linear. There are two possible explanations for this result:

- i. workers screen all job offers in Ostrava (considering their wage variability) at once, as it represents one local labour market, not gradually in different city districts; and
- ii. commuting distances within Ostrava City are not large enough to allow the quadratic term to have some significant impact on wages. In that case, the more willing is a worker to commute, the higher wage she/he will have.

4.3 Robustness check

It can be concluded that both national and local data-sets identified positive and statistically significant wage bonuses for inter-urban commuting, approximated by crossing municipality borders on the way to work (Models 1 and 5). Geographical distance between municipalities/city districts of residence and work (Models 2A and 7) and the time necessary to cover this distance by car (Models 3A and 8) were also found to be significantly correlated with wage level, although the functional form of this relationship was different for inter-urban and intra-urban commuting. Commuting time by public transport was associated with wage level only in the case of the local data-set, which correspond with greater efficiency of urban public transport services compared to inter-urban public transport. Despite using two different data-sets and four approximations of commuting, the results show the same robust picture – a greater willingness to commute is correlated with higher wage returns.

Neither the national nor the local data-set contains explicit information on commuting, which was approximated by the distance between municipalities / city districts of residence and work and time taken using information from the server *Mapy.cz*. As one may doubt the validity of this approximation, the wage model was re-estimated employing the *Mujplat.cz* data-set, which contains information on commuting time (6 categories per 15 minutes) and commuting distance (3 categories per 25 kilometres) provided by workers themselves. The lack of information on place of residence and work prevented us from using this data-set for estimating wage returns to inter-urban and intra-urban commuting separately. Results based on this data-set (see Tab. 4) provide further evidence on wage returns to commuting in the Czech Republic, as well as the opportunity to consider the validity of the approximation of commuting used in this article and the robustness of the results presented above.

The model re-estimation using the *Mujplat.cz* data-set (see Tab. 4) confirms positive and statistically significant relationship between wage level and commuting distance (Models 10–11), but not commuting time (Model 12–13). The results show that an increase in commuting distance

by 25 kilometres category results in a 7.4% wage bonus, i.e. at least 0.3% per 1 kilometre (Model 10). The wage returns to commuting are not linear, however, and reach a peak at a commuting distance between 25 and 50 kilometres with returns at the level of 12.6% (Model 11), which corresponds with the findings for inter-urban commuting (see Model 2A). In addition, this data-set also confirms the previous finding that the majority of employees commute below the wage-maximising distance, as 87.5% of them commute up to 25 kilometres.

As stated above, no statistically significant relationship was found between wage level and commuting time, regardless of whether the linear (Model 12) or non-linear (Model 13) form was considered. The statistical non-significance of the commuting time coefficient can be due to a mixture of means of transport used for commuting by employees in the sample (including walking, biking, driving a car, public transport, etc.), which leads to less precise approximation of commuting distance and related costs. The national and local data-sets, on the contrary, approximate commuting time for specific means of transport, i.e. commuting time by car and commuting time by public transport, and found commuting time variables highly significant, with the exception of commuting by public transport in the case of inter-urban commuting. It can be concluded that results in Table 4 are not in contradiction with estimations based on the national and local data-sets, and tend to support their robustness.

5. Conclusions

A willingness to commute and subsequently real commuting behaviour represent very important factors in an individual’s employment and wage level, as they determine the size of her/his labour market. There is a substantial empirical body of research on wage returns to commuting for USA and Western Europe, but not for Central and Eastern Europe. Moreover, most empirical studies discuss the wage returns to commuting using national data, which provide very important information on general conditions in the labour market, but do not explore its validity for specific conditions in urban labour markets (such as more developed transport infrastructure, limited size and the geographical concentration of job opportunities). This article responds to both the limitations of current empirical literature on commuting in East Central Europe by providing evidence on wage returns to commuting in the Czech Republic, and by discussing wage returns to inter-urban and intra-urban commuting separately. Some attention was also devoted to specific topics such as the functional form of the relationship between commuting and wage level, the commuting distance maximising wage returns, and their differences on national and local labour markets.

Using data from the Czech Republic and Ostrava City, as national and local level data-sets, we have provided robust evidence on positive and statistically significant wage returns to both inter-urban and intra-urban commuting, which corresponds to returns in Western countries. The significance and magnitude of the regression coefficients suggest that commuting by car compared to public transport represents a more efficient means of travelling to work, although public transport is a viable alternative for intra-urban commuters.

The results also revealed that different spatial characteristics of large national and limited urban labour markets are reflected in the functional forms of the

VARIABLES	(10) In gross monthly wage	(11) In gross monthly wage	(12) In gross monthly wage	(13) In gross monthly wage
Commuting				
Commuting distance: linear trend (per 25 km category)	0.074** (0.034)			
Commuting distance: 0-25 km		baseline		
Commuting distance: 25-50 km		0.126** (0.051)		
Commuting distance: 50-75 km		0.056 (0.068)		
Commuting time: linear trend (per 15 min category)			0.009 (0.012)	
Commuting time: 0-15 min				baseline
Commuting time: 15-30 min				0.008 (0.031)
Commuting time: 30-45 min				– 0.025 (0.040)
Commuting time: 45-60 min				0.006 (0.046)
Commuting time: 60-75 min				0.124 (0.081)
Commuting time: 75-90 min				0.089 (0.077)
Education and work experience				
Primary education	– 0.344*** (0.083)	– 0.348*** (0.084)	– 0.308*** (0.061)	– 0.309*** (0.062)
Secondary education	– 0.187*** (0.052)	– 0.186*** (0.052)	– 0.194*** (0.047)	– 0.196*** (0.047)
Tertiary education	baseline	baseline	baseline	baseline
Work experience	0.011* (0.006)	0.011 (0.007)	0.010 (0.006)	0.010 (0.006)
Work experience squared	– 0.000* (0.000)	– 0.000* (0.000)	– 0.000 (0.000)	– 0.000 (0.000)
Physical characteristics				
Female	– 0.161*** (0.033)	– 0.161*** (0.033)	– 0.168*** (0.032)	– 0.168*** (0.032)
Family characteristics^I				
	yes	yes	yes	yes
Employer and job characteristics^{II}				
	yes	yes	yes	yes
Location^{III}				
	yes	yes	yes	yes
Constant	9.408*** (0.178)	9.470*** (0.177)	9.462*** (0.187)	9.467*** (0.177)
Observations	785	785	931	931
Adj. R ²	0.521	0.522	0.508	0.508

Tab. 4: Wage returns to commuting based on the Mujplat.cz data-set (regression coefficients reported)

Source: authors' computations

Notes: Robust standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; See Appendix 2 for full results; I – Marital status; II – Part-time job, Real working hours per week, Permanent employment contract, Occupation skill level, Supervisory position, Sector of economic activities (Private, Public, Non-profit), Number of employees, Ownership; III – NUTS3 region, Residence town size, Job opportunities

relationships between commuting distance and wage level. Non-linear wage returns to inter-urban commuting made it possible to quantify a commuting distance between municipalities associated with the highest wage returns. They are 35.1 kilometres or 31.5 minutes of travel by car in one direction, which are connected with a wage bonus at the level of 11.6% and 16.6% respectively. The real commuting distances, however, are significantly shorter (a mean route length of 17.5 km and 18.5 minutes by car), which can be ascribed to commuting costs. A simple example presented in the article suggests that real commuting behaviour represents a compromise between an economically rational preference for short commuting distance and the need to find suitable employment. On the other hand, wage returns to commuting within Ostrava's labour market were found to be linear, which may be connected with its limited size and thus different job-searching processes. It can be concluded that both inter-urban and intra-urban commuting pay off in the Czech Republic, although there are significant differences between them. From a methodological point of view, this article has explored the suitability of data provided by the on-line application Mapy.cz for the approximation of commuting time and distance. A comparison of the data and results from different datasets, combining real and approximated data on commuting, suggests that data from the Mapy.cz application represents a suitable approximation for missing or limited data on commuting.

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Supplementary material

The Appendixes 1 and 2 are available at: <https://cdrive.vsb.cz/index.php/s/bDzxTnGEKfwntxe>

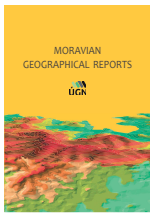
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Localised capabilities as an intermediating factor in the transition from an old to a new development path: The case of post-socialist industrial towns

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Abstract

There are debates in the research literature about the mechanisms responsible for the formation of local development trajectories. What is emphasised, as particularly scarce, are longitudinal studies which show how historical, social and institutional structures are reproduced and/or transformed into new paths of development in the case of industrial towns. This paper aims to capture the role of various social, cultural and institutional features that constitute localised capabilities, in the process of transition from an old to a new developmental path for older industrial towns. The authors use case studies of three medium-sized industrial centres in Poland: Dzierżoniów, Starachowice and Mielec, to illustrate how localised capabilities are shaped by the interplay of earlier economic activity and the characteristics of local firms, on the one hand, and the evolving social, cultural and institutional attributes of the particular town and its region on the other. As a result, industrial towns may differ significantly in their ability to absorb exogenous impulses, as well as their capacity to transform and recombine them into a new development pathway that is more resilient than the old one.

Key words: industrial towns; local development; path creation; localised capabilities; post-socialism; Poland

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1. Introduction

There has been an on-going debate on the role of historically-developed spatial, economic, and social structures in the formation of new local and regional developmental trajectories. As Hudson (2005, p. 594) put it, the aim is to understand the reasons why regions and towns “change in varying ways – some to become winners, some to become losers.” This is especially interesting in the case of industrial towns which strive for new foundations of growth, in the face of collapsing or declining traditional economic activities.

Many scholars tend to present a rather pessimistic view on the future well-being of old industrial towns. There is a large amount of literature discussing the reasons for this and the mechanisms explaining why towns and regions historically dependent on manufacturing and mining, find economic revival very difficult. It is argued that they exhibit low economic resilience and create an environment which is detrimental, rather than conducive, to creative destruction and the development of new economic activities (Jacobs, 1969; Martin, 2010; Drobnia, 2012; Harfst et al., 2012; Boschma, 2015; Gong and Hassink, 2017). This

is interpreted in terms of their development trajectories, gradually leading to a lock-in as a result of overspecialisation (Tichy, 2001; Hassink, 2010), historically developed socio-cultural factors, in particular low levels of entrepreneurship (Hudson, 1989; Harfst et al., 2018), oligopolistic economic territorial structures (Chinitz, 1961; Saxenian, 1994), and/or institutional sclerosis and rigidification (Olson, 1982; Grabher, 1993; Glaeser, 2011).

From theoretical and pragmatic perspectives, it is far more interesting to find out why and under what conditions the declining industrial towns started to overcome the crisis, rather than what caused their collapse. Coenen et al. (2015, p. 851) claim that a key question is “how such [places] may, or may not, be able to break out of locked-in paths of development by pursuing innovation, new technological paths and industrial renewal.”

East Central Europe appears to be a particularly interesting region for the study of processes of the adjustment of industrial towns associated with discontinuous change. The post-socialist transformation jeopardised the dominant position of many large industrial enterprises, especially those

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associated with military production. The intriguing cases are towns which successfully broke out of the vicious circle of decline and created a new path of development, despite their disadvantaged geographical location outside areas of faster economic growth, metropolitan areas primarily, and far away from motorways. They may owe their success to specific historical social and cultural characteristics.

The authors aim to capture the role of various social, cultural and institutional features that constitute localised capabilities, in the process of transition from an old to a new developmental path for industrial towns.

The paper is structured as follows: It begins with theoretical debates on path creation in old industrial towns, its mechanisms and the underlying factors. It is argued that the concept of dynamic localised capabilities may be particularly useful in this context. The analysis of our three case studies starts with an outline of their historically-formed economic and social characteristics, as a background to and a brief presentation of their economic performance since 1990. This is followed by the identification of local developmental trajectories of the three towns and an interpretation of the mechanisms by which localised capabilities influence the development of such industrial towns. Conclusions focus on the broader lessons which can be learned in this respect.

2. The debates: Path creation in old industrial towns and the role of localised capabilities

There is a growing number of studies on the processes and mechanisms in the creation of new paths of development, especially in evolutionary economic geography. Following Lester (2003), four major mechanisms are distinguished, depending on the relation of new economic activities to the competences existing earlier in the place: indigenous creation; transplantation from elsewhere; diversification into related industries; and upgrading of existing facilities. The first two of these represent a form of deep restructuring (Boschma and Lambooy, 1999), since they are based on new sectors and competencies in a given area. Indigenous creation means the emergence of entirely new activities, primarily as a result of local entrepreneurship and search processes for new business models, and the commercialisation of research outcomes and/or social innovation. Transplantation refers to the appearance of new activities due to the involvement of external investors, foreign direct investment in the main.

By contrast, the two other mechanisms are of an adaptive nature and indicate diversification into technologically related, but usually more advanced, industries (Neffke et al., 2011; Isaksen, 2015), or some sort of revival of traditional sectors by means of their upgrading through product and process innovations (Lester, 2003; Martin, 2010). There is a debate on whether new path creation relies on the activation of local resources, which were underestimated or undiscovered earlier, and/or to what extent it depends on capital and actual innovations transferred from elsewhere (Isaksen, 2009; Nilsen, 2017). As Trippel et al. (2018, p. 691) argue: “the nexus between the inflow of non-local knowledge and new growth paths (...) is still poorly understood.”

Most authors agree that the creation of new economic structures is rarely an entirely ‘new beginning’, and that it cannot be understood without taking into account earlier economic, social and spatial structures, local knowledge and competences and existing spatial relations. This is emphasised both by older conceptual models, for example Massey’s (1984) layers of investment, and the new evolutionary economic

geography. Blažek et al. (2019) write about the “regional asset base”, which is conditioned by past economic activities and which influences future rounds of development (MacKinnon et al., 2019; Baumgartinger-Seiringer et al., 2019). The room for maneuvering for industrial towns in path creation differs depending on their characteristics and location. The scale of decline and avenues of revival are linked to such factors as town size, degree of dependency on a declining industry or company (diversification of local economy) and location vis-à-vis major zones of economic activity (i.e. Hassink 2010).

Pike et al. (2010) argue that towns and regions with traditional industry rarely create a totally new development path and rather follow a path of weak adoption of old structures. Isaksen (2015, p. 597) maintains that “path renewal and creation in thin industrial milieus can hardly build entirely on scarce regional resources but [instead] demand inflow of [new] technologies and knowledge.” Hudson (1989, 2005) points out that the solutions adopted in response to crisis in the towns of North-East England, based on attracting external investors, became a cause for later crises and did not contribute to their long-term resilience. A study of two Norwegian single-industry towns by Steen and Karlsen (2014) confirms that exogenous shocks may spur activities that lead to upgrading and diversification of the local economy, provided the shocks are met with adaptive responses.

The debate on path formation in “single-industry” or “old-industrial” towns shows that in-depth, longitudinal studies of their development are still quite scarce. The need for such research has been emphasised recently by Blažek et al. (2019, p. 2), indicating that “the strategies of particular actors and the mechanisms of change during periods of decline are hardly analysed in detail.” Two questions are particularly important in this respect. First, how historical, broadly-defined social and cultural characteristics of a single-industry town are reproduced and/or transformed into a new path of development, since the main focus is often on only economic characteristics. Second, to what extent this emerging development path of the town creates structures more resilient to future crises than the one formed in the past.

The answers to these questions require going beyond the concepts of the evolutionary approach and taking into account perspectives provided by institutional and relational economic geography (Steen and Karlsen, 2014; Trippel et al., 2018), as the trajectories of local economies are significantly shaped by various institutions and networks of social relations, which are place-specific (Hassink et al., 2014; Grillitsch, 2015). Many authors criticise the neglect of the role of non-firm actors in the evolutionary approach, paying little attention to the importance of historical social and cultural characteristics, as well as territorial institutions (MacKinnon et al., 2009; Pike et al., 2009; Isaksen, 2015). Relational economic geography points to the embeddedness of actors in social networks and institutions at various spatial scales (Bathelt and Glückler, 2003), while the institutional perspective claims that both distinctive formal and informal institutions are of central importance for evolutionary trajectories of local and regional economies (Gertler, 2010; Hassink et al., 2014; Grillitsch, 2015).

In recent years, the need to elaborate the agency perspective on path development, one that goes beyond the study of firms and firm-related actors, has been highlighted (Trippel, 2017; Grillitsch, 2016; Grillitsch and Sotarauta, 2018). Indeed, the success or failure of local and regional development plans cannot be explained without acknowledging the critical

role played by the decisions and actions of individual and collective agents. There is a debate on the conceptualisation of human agency in regional path creation (see Isaksen and Jakobsen, 2017; MacKinnon et al., 2019). On the one hand, some authors (Uzzi, 1997) argue that the actors' behaviour is strongly embedded in existing social and economic structures. Thus, the room for a new path that deviates strongly from the existing local and regional paths is limited. Other scholars advocate much more freedom in actors' decisions (Garud and Karnøe, 2001). For example, Sydow et al. (2010) describe the mechanism by which intentional actions by individuals resulted in regional path-dependence in the Berlin-Brandenburg optics cluster.

As the role of agency in different local and regional contexts is still poorly understood, Steen and Hansen (2018, p. 206) call for more research on "how different actors' strategies and activities are influenced by the networks, markets, value chains, policy frameworks, and broader institutional environments in which they are embedded." Searching for a more integrated perspective on the role of agency, McKinnon et al. (2019) have recently proposed a conceptual framework linking the path creation literature with the notion of "strategic coupling" in a geographical political economy approach. They maintain that key individual and collective actors, operating within multi-scalar institutional environments, create new development paths through the coupling of endogenous and extra-regional assets.

We argue that various social, cultural and institutional factors create dynamic localised capabilities – produced, reproduced and/or eroded by the relationships between firms and the territory where they operate. Dynamic localised capabilities can be seen as a specific mechanism intermediating in the creation, evolution and destruction of developmental paths.

Firms, especially large companies, are regarded as the major agents of change and movers of economic activities. Towns and regions, however, should not be treated as passive recipients or victims of firms' activities. Schoenberger (1999, p. 211) emphasises that firms "must confront and respond to the particularities of these places across the whole range of practices and issues." Business strategies are both path- and place-dependent.

Local and regional developmental trajectories can be seen as outcomes of the interplay between firms and territory, which Dicken and Malmberg (2001) label as the firm-territory nexus. The firms are involved in networks of economic, social and political relations with many local stakeholders. On the one hand, there are the properties, strategies and activities of companies, and on the other, various local phenomena and processes, including migration, changing expectations and aspirations, as well as any institutional dynamics or inertia. The interaction between these two factors creates, enhances and/or hinders particular mechanisms of local and regional development. In the evolutionary perspective of the firm, competitive advantage, strategies and practices of the company depend on various assets available in its environment. Thus, the competences of the firm are based on "created localised capabilities" (Maskell, 2001), which are an attribute of particular places. These capabilities may be helpful in interpreting how local developmental trajectories change over time.

The dynamic localised capabilities can be defined as tangible and intangible assets embodied in people, firms and institutions, as well as in multiple relationships between them in a particular place (Domański, 2005): "They include the skills and attitudes of the workforce and entrepreneurs, the quality and reliability of suppliers and a broad range of institutions, including public authorities, business associations and NGOs. The company's knowledge of the capabilities of the partners contributes to trust in the relationships developed by the firm in the region. This may rest on social capital and the characteristics of civic society" (Domański and Gwosdz, 2009, pp. 455–456). On the one hand these capabilities are shaped by company features and strategies, and on the other they depend on various local characteristics.

We may distinguish two types of localised capabilities: generic and industry-specific. The generic capabilities may support various economic activities, whereas industry-specific capabilities are associated with individual industrial sectors. Generic and industry-specific localised capabilities include, but go beyond, the generic and specific factors discussed by Boschma and Lambooy (1999), who put emphasis on general vs. specialised knowledge and skills, which they link with urbanisation and localisation economies respectively.

3. Data and methods

Capturing the role of various social, cultural and institutional features that make up localised capabilities requires combining the general perspectives discussed above, with insights into specific processes and local contexts. Thus, an understanding of the process of transition from an old to a new developmental path of industrial towns can be achieved by in-depth case studies, which are especially useful in the investigation of contemporary social and economic mechanisms¹.

Our empirical analysis is focused on the case studies of three medium-sized industrial centres in Poland. At first glance, the three selected towns: Dzierżoniów (33,300 inhabitants) Starachowice (48,900 inhabitants) and Mielec (60,400 inhabitants), showed striking similarities in their geographical and economic characteristics in the early 1990s. They were located far away from growing metropolitan areas and planned motorways,² and they experienced a deep crisis after the collapse of dominant large factories, revealing one of the highest unemployment rates in the country. Therefore, a vicious circle of decline seemed inevitable. In fact, it was very much the case in Starachowice and Dzierżoniów, while Mielec was able to forge a new developmental trajectory. The towns are located in three different historical regions, taking into consideration the partition of Poland in the 19th century: Mielec belonged to Austria, Starachowice to the Russian Empire, and Dzierżoniów to Germany (see Fig. 1). The latter town was part of Germany until 1945.

The comparative analysis of the towns is based on statistical data derived from the Central Statistical Office of Poland, and the District Examination Commissions. The widely-acknowledged national rankings, including the ranking of the so-called "business gazelles" published by Puls Biznesu daily, the list of the largest companies and exporters by Rzeczpospolita daily, rankings of self-government revenues

¹ See Yin (2009) for the broader characteristics of case study research.

² Poor road accessibility was considered a major disadvantage of the location in Mielec by company managers who were interviewed. The situation has improved with the opening the A4 motorway, some 30 km south of the town in 2014.

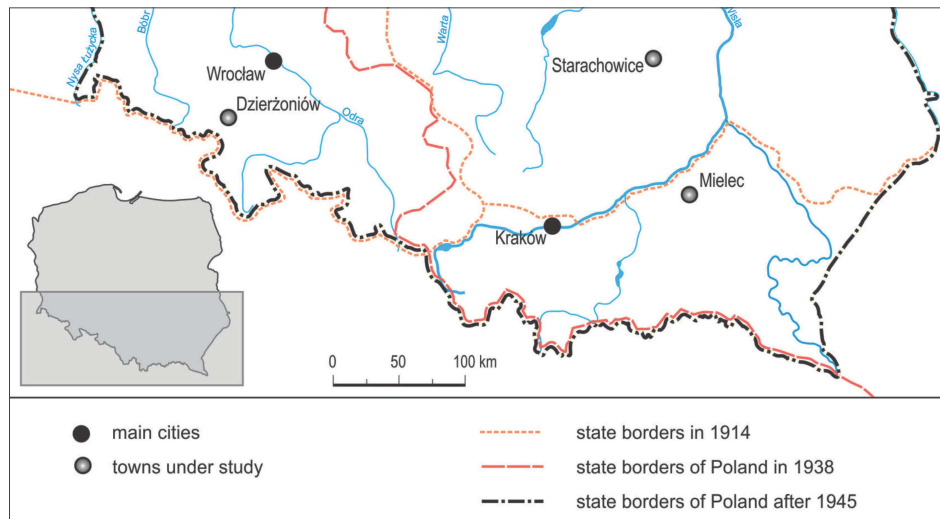


Fig. 1: Dzierżoniów, Mielec and Starachowice in the context of the historical borders of Poland
Source: authors' elaboration

and quality published by *Wspólnota* quarterly, and the ranking of secondary schools (published by *Perspektywy* magazine) were also used. Official reports and transcripts of the local council meetings (1990–2015) provided detailed information and interesting insights into the opinions and interpretations of the local situation by various stakeholders. In addition, 75 interviews were conducted with officials of local governments and other public institutions, former and contemporary company managers and entrepreneurs.

4. Case studies of the towns of Mielec, Starachowice and Dzierżoniów

Mielec is one of the localities in south-eastern Poland, which benefitted from the development of the “Central Industrial District” (COP) program – a large economic project of inter-war Poland. In the 1930s, the government launched the construction of numerous factories, mainly military facilities, in the so-called security triangle in what was Central Poland at that time, due to its long distance from the borders with Nazi Germany and the Soviet Union. A number of entirely new towns, including Stalowa Wola (steel plant), Nowa Dęba (ammunitions factory) and Nowa Sarzyna (chemical plant), were established along with new factories located in existing towns, such as Mielec, Dębica and Rzeszów. The flat terrain and good weather conditions enabled Mielec to become the main aircraft plant. This was a turning point for the small town, which had been a local market and craft centre until then (9,640 inhabitants in 1939).

After World War Two, the aircraft plant WSK PZL Mielec experienced a further boost to its production capacity, accompanied by growth of the urban population (58,000 inhabitants in 1988). As a typical industrial town in COP, however, it was hugely dependent on a single large manufacturing company. In 1987, it employed 20,800 people, i.e. 75% of the town's working population and 40% of that of its surroundings (county). These were overwhelmingly male jobs and non-manufacturing workplaces hardly compensated for this unbalanced structure. Women constituted just 37% of total employment in the town in 1975. This situation was related to the fact that Mielec, similar to many industrial towns under state socialism, including Starachowice, had limited service functions and underdeveloped small and medium enterprises (SMEs). The latter issue also stemmed

from the extermination of the Jewish population, which represented about 60% of the town population in 1939 (53% in Starachowice). In the case of Mielec, weak services were also associated with its sparsely-populated hinterland (large woodland areas).

With the end of the Cold War and the loss of the Soviet and Middle East markets, the state-owned aircraft manufacturer faced increasing difficulties. The failure of subsequent restructuring strategies resulted in dramatic job cuts (from 20,100 in 1989 to 8,700 in 1994). At a labour market with limited alternative employment opportunities, this problem inevitably led to mounting unemployment. Despite large-scale intervention, public works and the growth of small private companies, the unemployment rate remained at the level of 21–22% throughout the first half of the 1990s (see Fig. 2).

Attracting new investors was a crucial factor of the economic restructuring of Mielec in the 1990s and the beginning of the 2000s. In 1995, after a vigorous local campaign, the first Polish Special Economic Zone (SEZ) was established in the town. Within ten years, this led to the creation, directly and through multiplier effects, of more than 14,000 new jobs in Mielec county. There are about 50 companies in various sectors which opened their plants in the town. The economic growth and diversification of the local economy have also been supported by the emergence and development of numerous SMEs, partly as spin-offs of large enterprises. Furthermore, the acquisition of the bankrupt aircraft plant by the American manufacturer of helicopters (Sikorsky) in 2007 has revitalised its activity (1,700 employees today) and attracted a couple of producers of sophisticated aircraft components to the area. The unemployment rate is now among the lowest in the region (4.4% in 2018).

Starachowice has a much longer industrial history than Mielec, even though it is a younger town. Since antiquity, the area was a centre of iron-ore mining and iron-making. In the 19th century the ironworks were modernised, while in the inter-war period, the metallurgical plant was expanded into an artillery equipment factory within the program of industrialisation of Central Poland (COP) mentioned above. In 1939, the industrial village of Starachowice was merged with the small town of Wierzbnik: the new town had 13,210

inhabitants in 1939. In 1948, a truck factory (FSC) was established on the basis of an old plant. The army was the chief customer. Several small local plants were incorporated into FSC, and others became its suppliers. This further weakened the limited economic diversification of the local economy. FSC employed over 22,000 people in its heyday in the mid-1970s.

The beginning of the post-socialist transformation in Poland brought about a profound crisis to the factory. Drastic layoffs took place in FSC and unemployment reached 28% in 1996. The only case of success was the foundry, which spun off from FSC as a private company in 1993 and became a core of the capital group *Odlewnie Polskie*, listed on the Warsaw Stock Exchange with 435 employees in 2015. In 1999, after several unsuccessful privatisation attempts, FSC was sold to the German truck and bus producer MAN. The new owner acquired L of the area of the former truck factory and took over 900 of its 2,500 employees. It quickly terminated the production of trucks and began the manufacturing of labour-intensive parts and bus frames. At first, very

simple components, such as wire harnesses, were made in Starachowice; later on, the production of welded body parts was introduced. Finally, in 2016, MAN transferred the assembly of complete vehicles to Starachowice, with current employment of 2,400 people.

The idea of a special economic zone emerged in Starachowice as early as in 1991; however, it commenced its operation only in late 1998. The success of Mielec in attracting external investors was repeated neither in Starachowice, nor in several other medium-size industrial towns in Poland. By the end of 2004, the Starachowice SEZ attracted 2,100 new workplaces (in comparison to over 7,500 in Mielec), and the number rose to 4,400 in 2016 (9,000 in Mielec). The vast majority of investors in the Starachowice SEZ represent medium-low-tech industries, mainly metal-working (70% of companies). The level of entrepreneurship remains low. Rapidly growing small- and medium-size enterprises are scarce (11 entities compared to 58 in Mielec between 2001 and 2016); furthermore, they mainly represent medium-low and low-tech branches (see Fig. 3).

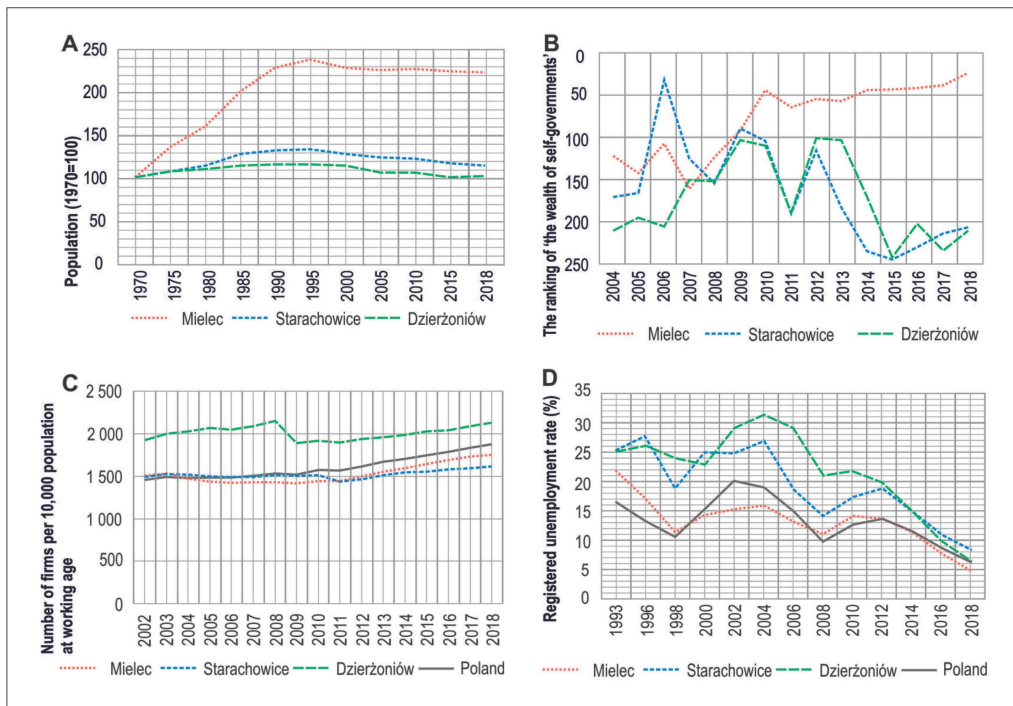


Fig. 2: Performance of the studied towns in the light of selected economic and social indicators
Source: authors' elaboration based on data from the Central Statistical Office of Poland

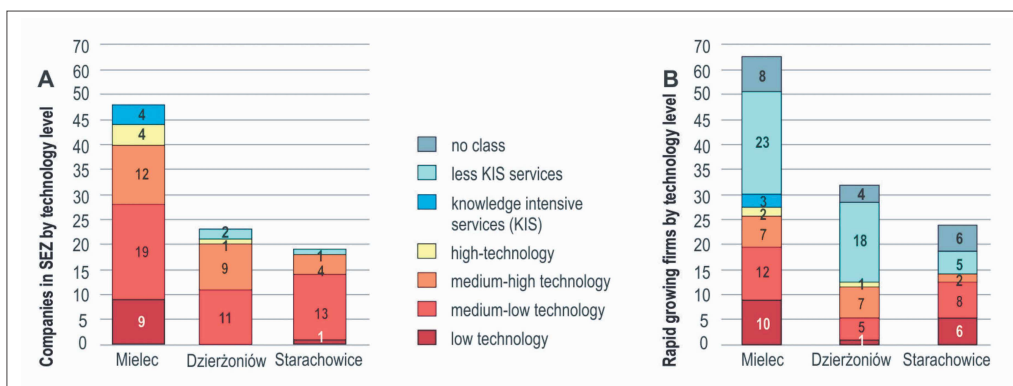


Fig. 3: Comparison of the technology level of firms classified as “business gazelles” and companies located in Mielec, Dzierżoniów and Starachowice special economic zones
Source: authors' elaboration based on the rankings *Gazete Biznesu* 2001–2016 and the data from Mielec, Dzierżoniów and Starachowice Special Economic Zones.

The shrinkage of the local labour market came to a halt after only 15 years, but the town has not managed to return to its employment level of the early 1990s. It experienced a short period of economic growth between 2004 and 2008, followed by further decline between 2007 and 2011 and slight improvement in recent years. The unemployment rate was still 19% in 2012 and dropped to 9.2% in 2018 (Fig. 2). The town has lost 12% of its population (as compared to 0.5% loss in Mielec) since 1990. The effects of the long period of decline can be seen in the low revenues of the local budget – Starachowice is lagging behind other county towns in Poland in this respect (Fig. 2).

The town of Dzierżoniów is situated in Lower Silesia province in south-western Poland, which was part of Germany before 1945. Weaving traditions in the region lay at the root of the location of cotton mills in the town in the 19th century. Their facilities were used for the production of military radio stations starting in 1943. Dzierżoniów (Reichenbach) had 17,250 inhabitants in 1939. Since 1945 the displaced German population has been replaced by Polish settlers, about one-third of whom had originally inhabited the former eastern provinces of Poland, incorporated into the Soviet Union after the war. The post-war economic development in the town rested on two large state-owned enterprises: the manufacturer of consumer electronics Diora and the cotton mill Silesiana. Diora remained the largest manufacturer of radio receivers in Poland until the mid-1990s. In addition, it made audio systems, television sets and video recorders. Silesiana consisted of four spinning and weaving plants in Dzierżoniów. In 1979 it employed 3,200 people, while Diora had 6,420 employees, together with a few branch plants in neighbouring towns.

The post-socialist opening of the Polish market to foreign competition in the early 1990s proved lethal to both companies, which offered outdated products and used old technological lines. Massive layoffs began in 1990, and the two companies got rid of their branch plants and gradually sold off all of their physical assets. Diora went bankrupt in 2001. Silesiana continued production as NGK Pluton after 1997, but finally ceased to exist in 2005. The unemployment rate was 25.8% in 1993, and reached a record level of 31.7% in 2004 (Fig. 2). In 1997 a special economic zone was established in Dzierżoniów. By 2018, there were 23 firms in the zone employing 2,400 people. The town's entrepreneurship level is above the national average, significantly higher than in Starachowice and Mielec, in the service sector in particular. The town's population peak (38,430) was reached in 1992 and the number of inhabitants decreased to 33,340 in 2018. The last decade brought a radical reduction in unemployment to 6.1% in 2018, i.e. less than that in Starachowice. It is particularly low among women (3.2%), who had represented a large share of industrial employment in the past in the Dzierżoniów area.

5. Development trajectories of industrial towns and role of localised capabilities

The relatively successful economic restructuring of Mielec rests on three co-existing trajectories: the location of external investors; the activity of small- and medium-sized local manufacturing firms and producer services; and the revival of the dominant industry (plant). The first one, which was brought about by the early creation and later growth of the Special Economic Zone, was vital in triggering the emergence of a new path of development. In combination

with the growth of local SMEs, it contributed to the creation of a diversified industrial centre with numerous companies of different sectors and sizes.

What distinguishes Mielec is the high quality of the management of change. In the 1990s, local stakeholders established a successful coalition of local government officials, trade union leaders, managers and politicians, which transferred the idea of a Special Economic Zone from Ireland to Poland, and managed to persuade the government to establish it in Mielec (Jarczewski and Gwosdz, 2007). A relatively rich business environment was created, including the local development agency, two incubators (one technological) and a subsidiary of the leading Polish technical university. There has been a substantial continuity in the local authorities, as the mayor elected in 1994 governed the town for 20 years. The town is a benchmark for low expenditures on administration in Poland according to Wspólnota rankings (Fig. 2). Since the country joined the European Union, Mielec has become an exemplar of the efficient use of the EU funds.

In Starachowice, all the typical solutions for the restructuring of the local manufacturing base (deep restructuring of the existing industry, searching for new opportunities by attracting branch plants and creating entrepreneurship culture) were tested, but with modest success. Quite surprisingly, the scenario for the regeneration of activities relying upon the industrial tradition of the town, proved to be the most influential, though it was a long and painful process. This made Starachowice the European export platform of MAN city buses, with some medium to low technology firms in the SEZ (mainly metalworking), which then does not contribute to the diversification of the local economic base in a significant way.

The quality of management in Starachowice was substantially weaker than in Mielec. Although the local elite accurately defined the main problems, it was far less effective in the implementation of adequate measures. No strong coalition of local stakeholders emerged that could mobilise social activity around a new vision of the town, and which had an opportunity to pursue their vision for longer than four years. The local government has alternated in power all the time since 1990, between a post-communist left and a local conservative coalition. There were seven mayors in Starachowice between 1990 and 2016, two of whom were dismissed from office, including one due to a corruption scandal. Local political conflicts and scandals were one of the reasons for the limited success in attracting investors to the Starachowice SEZ. It is symptomatic that when MAN decided to locate a heavy truck factory in Poland in the mid 2000s, it did not choose Starachowice, but a locality near Cracow, where a greenfield plant was built. The quality of local management reflects a wider deficiency in the civic culture in the region, where the resources of social capital are ranked amongst the poorest in Poland (Działek, 2011).

The scenario of the town restructuring by SMEs activity in Starachowice was quite elusive. Poor local entrepreneurship can be attributed to the deeply-rooted culture of dependence and the relatively low quality of human capital reinforced by out-migration after 1989. In contrast to Mielec, the modest success of reindustrialisation in Starachowice has not stimulated the broader development of local services, which manifests itself in the stagnation in total employment and the lack of fast-growing service companies. Hence, Starachowice remains rather vulnerable

to external shocks, what is clearly visible in its overall employment fluctuations in line with general trends in the Polish and European economy.

To take the story further, Dzierżoniów experienced the most radical form of decline – the complete disappearance of the two industrial facilities that had formed the economic base of the town and its environs. It is hardly surprising that the pace and scale of the collapse overwhelmed local authorities, with frequent changes in leadership: four mayors between 1990 and 2000. Nevertheless, in the late 1990s, new local initiatives appeared, some of which were unique in the country, e.g. one of the earliest urban regeneration programs in Poland (1997), the very first ISO management certificate (1999), and various institutions aimed at promoting local entrepreneurship, including a business incubator, a loan guarantee fund, and a social council of local business leaders.

In general, far less re-industrialisation has occurred in Dzierżoniów than in the other two case studies, along with an almost total de-locking from the former path of development. Investors that came to the town had little to do with the formerly dominant industries and were chiefly attracted by the easy availability and low cost of the local labour force rather than its specialist skills. New firms now located in the SEZ, however, are predominantly medium-size (only one employs more than 500 people), therefore Dzierżoniów is far less dependent on large employers than in the past, and even less so than Starachowice and partly Mielec. There is also some commuting occurring to the neighbouring metropolitan area of the city of Wrocław. The number of jobs in Dzierżoniów has stagnated in the last decade and the employment rate now is lower than that in both Starachowice and Mielec. Still, what significantly contributes to the currently low unemployment in the town is the growth of SMEs. Among other elements, there are about a dozen medium-size local firms established by the former employees of Diora, that represent medium-high and medium-low technologies and manufacture automotive parts, aircraft parts, and home appliance components. More importantly, Dzierżoniów enjoys high entrepreneurship levels in the service sector, despite the fact that the development of services is hindered by general depopulation and the deindustrialisation of neighbouring smaller towns and villages, which had historically depended on the textile industry.

The contrast between the processes observed in the industrial towns under study may be explained by the differences in dynamic localised capabilities, which facilitate or hinder the development and upgrading of certain activities, and affect the quality of governance. In all towns we can identify features related to the dominant factory which became preconditions for their later success or failure. Together with the broader social and cultural characteristics of the town and/or region, they may foster or impede the break-out of the vicious path of economic decline.

In Mielec, high quality requirements and skills at all levels represented the industry-specific capabilities of aircraft production, which could be converted into generic capabilities. The latter also included high aspirations and pro-active attitudes associated with a prestigious position of the aircraft factory, the non-standard character of production (in contrast to mass assembly in Starachowice

and Dzierżoniów), and the existence of supporting industries, e.g. diesel engine and fuel injection equipment plants, and an advanced software centre. It is important that the local industry did not destroy the craft traditions which existed in the town before World War Two: they remained latent under state socialism, but turned out to be a relevant asset after 1990³. Thus, the capabilities related to the aircraft industry lay at the root of local economic activity, the quality of local institutions and public intervention.

Moreover, the social and cultural traits of the town and the broader region, which strengthen its generic capabilities, have to be highlighted here. The Małopolska and Podkarpackie regions, where Mielec is situated, are characterised by strong civic traditions that is reflected among other issues in the high turnout in elections throughout the last 25 years. The county of Mielec is classified by Działek (2011) in a group of entities with the highest resources of both bonding and bridging social capital in Poland. This can be accounted for by two major determinants. First, this part of Poland was not affected by mass migration movements in the aftermath of World War Two – in contrast to the Western Territories (formerly Germany) settled after 1945. Second, there was an almost uninterrupted functioning of institutions using the Polish language, including local governments and schools, since the mid-19th century, in contrast to the areas belonging to Russia and Germany before World War One, where they were not allowed. Good achievements at primary and secondary school levels in Mielec express educational aspirations (see Fig. 4). They are typical of south-eastern Poland in general, which can be associated with the long educational traditions mentioned earlier; still, these achievements are better in Mielec than the average in the region. There is also an attachment to place and the positive image of the town, which contributes to a stable population, contrasted to their decline in many Polish towns.

All these properties and activities allowed the town to create a new path of development, despite a rapidly aggravating structural crisis and its disadvantaged geographical location. The localised capabilities have been further enhanced through foreign investors and local entrepreneurs, together with the reliability of local institutions: the town authorities and the administration of the economic zone. Mielec remains an industrial town, but with a relatively wide diversification in terms of industrial sectors, technologies, the number and the size of companies, which makes it far more resilient to external shocks than in the past. What is more, the generic and specific capabilities created and reinforced since 1990 are still reproduced today.

The industry-specific and generic capabilities that existed in Starachowice provided a much weaker base for the restructuring of the local economy at the time of the collapse of the main manufacturing company. The assembly-type work required less skills and responsibility. In 1991, the president of the truck factory stated that “the weak point of the plant is quality, which is less a technical and more a social problem of the awareness of the employees”⁴.

This local industrial culture is connected with the broader cultural characteristics of this region in Central Poland, such as limited educational aspirations and lower shares of educated people, as well as weak self-government and

³ It is interesting that during the crisis of the early 1990s, when WSK PZL Mielec found it difficult to pay its liabilities, it sold or handed over pieces of its machinery to compensate for its debts, which became the technical bases for the start of some local manufacturing firms.

⁴ The statement of the CEO of Star in the report of the town council of Starachowice 1991.

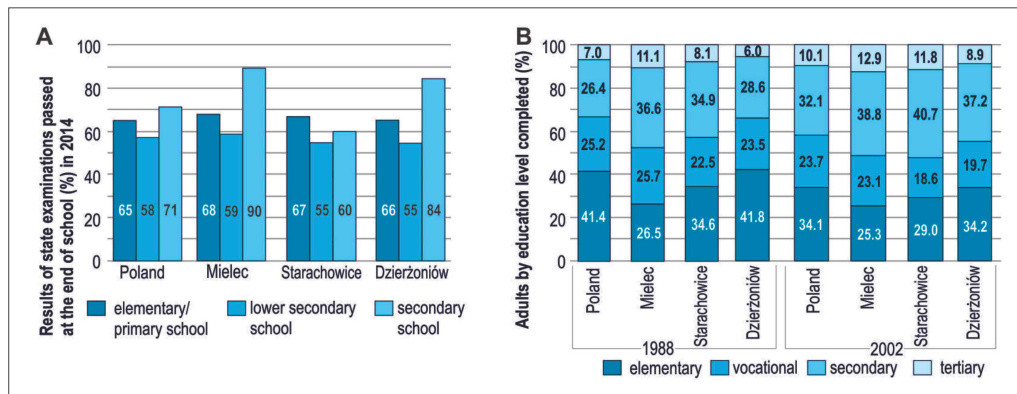


Fig. 4: Educational structure and school achievements in the case study towns

Sources: authors' elaborations based on the data of the Central Statistical Office of Poland and the District Examination Commissions

civic traditions. This is also seen in expressions in political preferences, as the post-communist party always received a much higher percentage of votes in Starachowice than in the country, and this can be seen as an indicator of sentiments in favour of centralised power and state control of local affairs. In contrast, such was never the case in Mielec, even at the time of the deep crisis of the early 1990s.

New manufacturing activities attracted to Starachowice had usually weak local supply linkages and were not accompanied by broader non-production functions. The automotive sector remains the primary industry in the town, at the same time reproducing or even strengthening the main features of the "old" developmental path in Starachowice: namely, its dependence on labour-intensive branches and segments of the value chain, limited non-production activities and external control. This hardly generates new industry-specific capabilities, which could stimulate upgrading and embed investors. Moreover, the generic capabilities created in the era of earlier industrialisation, including low educational levels and limited local entrepreneurship, are also reproduced rather than changed. In addition, the long-lasting crisis in the local labour market has undermined local capabilities, and has given rise to an unemployment culture, which, together with migration outflows, weakens local human capital even further.

Generic localised capabilities appear to produce a strong impact on the contemporary development trajectory of Dzierżonów. These factors stem from the concentration of between 600 and 800 engineers in the R&D centre of Diora, who are graduates of major Polish technical universities. In the 1990s, many engineers who were then in their 40s and 50s, built family and occupational ties to the town and decided to stay here despite the collapse of their employer. They shifted into local administration jobs and various public institutions. In addition, their competencies and social capital stimulated the development of social and cultural activities, which was important in reinforcing local attachment to place and pride in a town plagued with economic crisis. This is especially important in the situation of general out-migration trends characteristic of many towns in the western provinces of Poland, both under socialism and post-socialism due to weak local social ties, which led to the loss of human capital. Thus, Dzierżonów and Mielec confirm Glaeser's (2005) argument that the ability for economic revival of a town is contingent upon the manner in which local residents react to crisis – whether they tend to flee or search for new opportunities locally.

Consequently, in spite of a stagnating labour market and limited success in attracting external investors, Dzierżonów demonstrates surprisingly high entrepreneurship and good educational achievements. Substantial human capital, especially the large number of educated women, reinforced the educational aspirations and achievements of the town's younger generations, even though the general educational structure of the working class town was not favourable. To some extent, this factor constrained the development of a culture of unemployment and so-called learned helplessness, which became typical in many areas affected by the decline of economic activity in post-socialist Poland, and in its Western provinces in particular. Certain impacts of specialist localised capabilities related to former industries found expression in the development of a number of new, medium-size manufacturing firms.

All in all, the analysis of these three Polish industrial towns shows that the emergence of new economic activities and the evolution of new development paths depend on dynamic localised capabilities that comprise attachment to place and its image, aspirations, the motivation and skills of people, entrepreneurship culture and social activity, as well as adaptability and the quality of local institutions. These capabilities are the product of the dynamic interactions between earlier activity and the characteristics of local firms and industries on the one hand, and historically-formed characteristics of a town and its region, including migration trends, social capital and civic society, educational structures, and local institutions as well as government policies, on the other hand (see Fig. 5).

The impact of generic localised capabilities on the quality of local government is especially important: well documented also by Weck and Beißwenger (2014), in their study of different governance response to crisis in two peripheral industrial towns in Germany. Similarly, Květoň and Blažek (2018) show that an underdeveloped institutional framework may be a more important barrier influencing new pathways of less developed Central European regions, than pre-existing industrial structure.

Most of the available literature on industrial towns points to internal barriers that inhibit capabilities for economic revival on the basis of endogenous assets. These assets are regarded too weak for "new indigenous path creation", and hence seem to be doomed to "path extension" on the basis of existing industries or radical de-locking through decline (Iskasen, 2015; Blažek et al., 2019). Consequently, they need external investment, which may generate an inflow

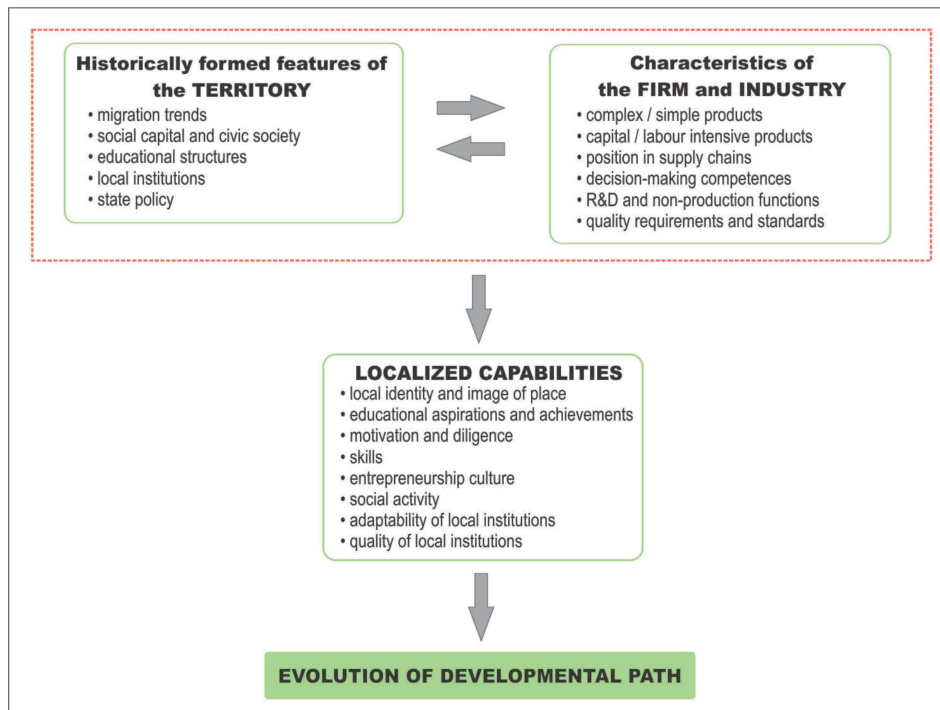


Fig. 5: The role of localised capabilities in the evolution of the developmental paths of a town
Source: authors' elaboration

of knowledge and technologies that enable the structuring of new paths (Tripl et al., 2018). The problem is that the comparative advantage of declining industrial towns often rests on low-cost labour and investment incentives that attract labour-intensive, low-value added activities (low-road restructuring). This reproduces the existing attributes of the local economy with a culture of dependency on wage labour and a lack of decision-making capabilities and non-production functions. As a result they become locked into the 'branch plant syndrome' (e.g. Sonn and Lee, 2012), and their long-term development is marked by recurrent crises (MacKinnon et al., 2009). This seems to be true of both Western and Central Europe, in general terms.

From our research findings, this study of three towns with similar economic conditions in the early 1990s and divergent economic trajectories later, demonstrates that industrial towns may significantly differ in their ability to absorb exogenous impulses, as well as to transform and recombine them into a new development pathway that is more resilient than the old one. Moreover, differences in their development cannot be simply attributed to their geographical location in relation to metropolitan areas as national growth centres. The localised capabilities studied herein have resulted in the emergence of varying trajectories of development.

In line with arguments put forth earlier, in all the studied towns, external investors play a role – but with different effects. In some cases, strong generic and industry-specific localised capabilities enable an adaptive response to impulses generated by the transplantation of firms from elsewhere, and gradually give rise to a hybrid mix of mutually interdependent mechanisms of upgrading and diversification, which is exemplified by Mielec. In other cases, neither generic nor industry-specific capabilities turn out to be conducive to significant upgrading of economic activities, and/or the development of new ones: the effect is exogenously-driven development in the town of Starachowice, for example. And sometimes, none of this occurs, and endogenous diversification into service industries based on generic localised capabilities

leads to some sort of stabilisation of the local economy at a low level of employment, as for example in the town of Dzierżoniów.

6. Conclusions

The transition from an old to a new development path for industrial towns cannot be explained by firm and/or sector character alone. The process of transition is intermediated by relational assets which may be regarded as dynamic localised capabilities. Localised capabilities are – by definition – a relational and dynamic phenomenon. They are continuously moulded – created, reproduced, enhanced or eroded – by the interplay of economic activities (firms) and the evolving attributes of the particular geographic area (town or region). The historically-formed social and cultural characteristics of the given place, along with institutional structures, may exert a strong influence on these capabilities, which are at the same time contingent upon the technological and economic attributes of the existing industrial branches and firms. Peoples' aspirations, attitudes, skills and patterns of behaviour that constitute dynamic localised capabilities, together with the related qualities of local institutions, shape specific local milieus that become more or less conducive to the particular paths of development of a town.

The importance of localised capabilities gains a vital position, particularly at the time of the shock stage – entailing the destruction of the old development trajectory. Localised capabilities may provide origins to 'mindful deviation', to use Garud and Karnøe's (2001) phrase, opening windows of opportunity for the impact of human agency, or to the contrary leading to a negative self-reinforcing path. Our study suggests that at such a turning point in local development, generic capabilities may matter more than industry-specific ones, associated with specialised competencies. This is because the former allows the redeployment or bricolage of existing assets in a wider spectrum of activities, which

in turn may increase the probability of constructing a new development path or strengthen the capacity for adaptive response to emerging exogenous impulses.

This analysis of the development of Polish industrial towns may also contribute to a broader debate on post-socialism. It confirms that the post-socialist transition did not consist of rapid and total displacement of the old system by a new system, as sometimes simplistically portrayed in early neo-liberal interpretations. Rather it was comprised of complex processes of change, once earlier structures formed in the socialist and pre-socialist periods had become transformed: therefore, such a transition cannot be understood without a broader historical perspective, as these are structures of long-duration (Domański, 2011; Sýkora and Bouzarovski, 2012; Ženka et al., 2015; Květoň and Blažek, 2018). It seems that these complex patterns of change are valid at national, regional and local scales.

Finally, some issues require deeper conceptual reflection and further detailed empirical studies. Multi-scalar interrelatedness and the embeddedness of firms needs to be taken into account (MacKinnon et al., 2009; Dawley, 2014; Pike et al., 2016). The nature of relationships between broader national and/or regional characteristics and institutions, on the one hand, and dynamic localised capabilities of particular places (towns), on the other, are of particular importance here. This includes the question of how localised capabilities affect the local response and capacities to exploit state-led growth impulses brought about by government policy. It is also interesting to what extent such localised capabilities are modified by state interventions – as a dialectical response.

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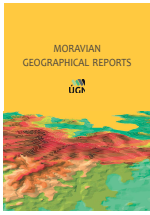
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From service areas to empty transport corridors? The impact of border openings on service and retail facilities at Polish-Czech border crossings

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Abstract

Long-term changes in the development of service establishments in the vicinity of the border crossing points on the Polish-Czech border are discussed in this paper. These changes are the result of the border being opened and subsequent economic integration. A series of panel studies, which took place in 1995, 2000 and 2016, analysed the locations and types of service establishments located within a half kilometre of 18 Polish-Czech border crossings. Given the increasing ease of crossing the border and the maintenance of passport and customs controls, the number of service and retail establishments increased until 2000. After the abolition of passport control in 2007, this number has decreased at many border crossings, with the most significant decreases in financial, insurance-related and commercial facilities (small shops). Most crossings have become little more than transport corridors that offer no important service functions. The total number of cultural, recreational and tourism-related establishments, however, has increased, mainly at border crossings located in towns and villages. The most important changes in service developments at the Polish-Czech border are discussed, as well as the probable reasons for these changes. The results may prove useful for spatial planning in municipalities that are located on the borders of countries undergoing political and economic integration.

Key words: economic integration, border opening, border crossings typology, transport corridors, service and retail outlets, Polish-Czech border

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1. Introduction

The impact that changes in national borders can have on adjoining areas is one of the established topics in geographic research (Jones, 1959; Minghi, 1963; Prescott, 1965). One important factor in such border changes is how geopolitical conditions affect the de-bordering processes. The geopolitical integration taking place across Europe in recent decades may be the most significant issue in this context, since, along with the democratisation that took place in post-socialist Central and Eastern European countries in the 1990s, it has contributed to radical changes in the functioning of political borders. From a practical standpoint, eliminating the control functions of border crossings at many national boundaries, including the one between Poland and the Czech Republic, is particularly important (Kolejka et al., 2015; Kolosov and Więckowski, 2018).

In 2007, three years after Poland and the Czech Republic joined the European Union (EU), border controls between the two countries were abolished. Opening the border made it possible to enter the neighbouring state at practically any point on the countries' shared border. This, in conjunction with the construction of new roads allowing for open car travel across the border, resulted in a significant increase in border permeability and traffic dispersion, since there was no longer any need to stop at a border crossing point. The integration process has had significant impacts in many respects, one of which relates to retail development in local border areas: free cross-border mobility has led to the decline of shopping and service establishments in the vicinity of border crossings.

Although border studies are of great interest to researchers in various disciplines – resulting in a multitude of studies and publications in this field – there have been few

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analyses of spatial development in terms of infrastructure and service functions at and/or near border crossings (with the exception of divided cities) (e.g. Cosaert, 1994; Davis and Friske, 2013; Khan, 2010; Miltiadou et al., 2017). This is particularly true for post-socialist countries such as those in East Central Europe (e.g. Dołzbłasz and Zelek, 2019; Furmankiewicz, 2000). Most existing research centres on issues of general socioeconomic development in border areas, encompassing tourism (e.g. Kládivo et al., 2012; Krátke, 1996; Ladysz, 2006; Málíková et al., 2014; Pászto et al., 2019; Potocki et al., 2014; Stryjakiewicz, 1998; Więckowski, 2010) and various forms of cross-border cooperation, also in the context of ‘Euroregions’ (e.g. Böhm and Drápela, 2017; Dołzbłasz and Raczyk, 2010; Furmankiewicz, 2005, 2007; Kaczmarek, 2006; Kurowska-Pysz and Szczepańska-Woszczyzna, 2017; Pipan, 2007; Turnock, 2002; Yoder, 2003).

Noteworthy studies on how transport accessibility, cross-border movement and shopping, impact neighbouring areas in the context of border permeability include: Kolejka et al. (2015), Komornicki (1999), Komornicki and Wiśniewski (2017), Kulczyńska (2018), Mackré (2008), Pászto et al. (2019), Rosik (2012) and Vaishar et al. (2013), with respect to Polish borders; and Capello et al. (2018), Fullerton and Walke (2019), Studzińska et al. (2018) and Szytniewski et al. (2017), for other countries’ borders. There are relatively few analyses dedicated to the spatial issues of cross-border trade and services, however, nor to entrepreneurial approaches to targeting customers from the neighbouring country. With regard to the Polish-Czech border, these include Böhm and Opiola (2019), Dołzbłasz (2015), Kulczyńska (2018), Kulczyńska and Matykowski (2008) and Powęska (2008, 2016).

It should be pointed out that there is a research deficit when it comes to studies focusing on managing land uses in the vicinity of border crossings, especially in relation to service functions and changes observed over the long term. As such, the analyses undertaken in this paper, taking the Polish-Czech border as an example, present a contribution to the domain of services development in connection with border crossings, in particular with regard to studying how such functions change over time. The results of the analyses may prove useful for theoreticians involved in studies of the impact of border permeability changes on surrounding areas.

The aim of this paper is to analyse changes in the number of retail and service providers, as well as their structural types, located within a half-kilometre of former passport border control points between 1995 and 2016. The authors aimed to identify the most significant features in terms of which service providers were found in the vicinity of border crossings, as well as any changes that had taken place over this time period in relation to border permeability, as well as the decrease in social and economic differences between Poland and the Czech Republic.

The analysis also offers a comparison with contemporary economic activity in the immediate vicinity of these border crossings, taking into account trade (commercial outlets), gastronomic facilities, financial and insurance-related services, etc., as well as an overview of changes in the structure and spatial distribution of facilities on the Polish and Czech sides of the border. We use a comparative approach to analyse the phenomena of cross-border services using a framework of symmetry and asymmetry, looking at changing dynamics and interrelations.

It also needs to be noted that research findings related to this topic – that is, changes in the development of the service infrastructure at former border crossings caused by border openings – may have potential applications in the spatial planning of borderland municipalities. This applies particularly to EU states that are planning to – but have not yet – joined the Schengen Agreement: at the time of writing this article, this would be applicable to the Romanian-Hungarian and Bulgarian-Greek borders, for example. The work may also be practically relevant to other countries planning to gradually reduce or eliminate border controls as a result of political and economic integration.

2. Border permeability and border crossings from a theoretical perspective

Research on borders and border areas is a longstanding area of study within many scientific disciplines, including geography and economics (Prescott, 1965; Newman, 2003a). The existence and management of inter-state border crossings and the conditions for crossing them are of great importance to a society and its economy. When analysing businesses operating in border areas, two issues seem particularly important: the role and function of the border itself; and phenomena related to cross-border shopping mobility (Boonchai and Freathy, 2020; Fullerton and Walke, 2019; Studzińska et al., 2018).

According to Rietveld (2012), a border assumes the form of a place or line within a certain space in which one observes a sudden drop in the intensity of interactions between two or more places. This contention is explained by five types of the barrier effects of borders:

1. Consumer preferences for domestic products or travel destinations;
2. National regulations, such as taxes, visas for foreign visitors or other legal constraints;
3. Different public and private institutions on both sides of the border (or different management centres);
4. Lack of information about foreign countries; and
5. Higher transport or communication costs related to crossing the border.

Acting as a barrier is an essential feature of a political boundary, and it is therefore important to analyse its permeability (Komornicki, 1999, 2004). The degree to which a border functions as a barrier depends on numerous factors, including geographic, economic and political issues. Since borders are subject to change (Anderson and O’Dowd, 1999; Nicol and Minghi, 2005), especially with regard to their functions, so too are the phenomena and long-term processes related to their influence. One well-known study by Martinez (1994) divides borders into four types of borderland: alienated, coexistent, interdependent and integrated. According to this author, these categories are not completely disjunctive, however, and it is usual for one to be dominant. The characteristics of frontiers can be related to either ‘de-bordering’ or ‘re-bordering’ processes (e.g. Blatter, 2001; Nelles and Durand, 2014; Newman, 2006; Popescu, 2011; Scott and Van Houtum, 2009; Scott, 2011; Van Houtum and Van Naerssen, 2002). The contemporary definition of ‘bordering’ is very broad: it is a multidimensional phenomenon encompassing trans-border relations that are personal, familial and professional, but that are also related to both local and central governance regulating border-related matters. The classic meaning of

‘bordering,’ on the other hand, regards it as a process of defining and controlling the boundaries of sovereign states (Newman, 2003b).

It should be noted that, due to the evolution of the concept of the border and diverse research approaches to the subject, it is currently thought that a border may constitute a kind of ‘resource,’ which can also provide opportunities for development and yield beneficial outcomes (Agnew, 2008; Gerber et al., 2010; Heffner, 1998; Knotter, 2014; Martinez, 1994; Reitel, 2006; Sohn, 2014; Sohn and Lara-Valencia, 2013; Timothy, 1995; Timothy and Gelbman, 2015; Van der Velde and Spierings, 2010). One example is seen in a border’s ability to generate border shopping (Anisiewicz and Palmowski, 2014; Boonchai and Freathy, 2020; Fullerton and Walke, 2019; Studzińska et al., 2018). It is important to note that borders can have both positive and negative effects simultaneously (Dołzbłasz, 2015). Under particular economic and political conditions, for example during advanced integration processes, the role of the border as barrier may be lessened; but as a rule, its negative effects cannot be entirely avoided (Ackleson, 2005). Eliminating barriers usually yields a positive outcome for the functioning of border areas, e.g. by serving as a stimulus for economic growth. It may also have negative consequences (Dołzbłasz, 2017). As observed by Spierings and Van der Velde (2008), removing borders and, in turn, levelling the economic differences between neighbouring areas, may result in the eradication of interactions between local inhabitants, for example those who partake in trans-border shopping or tourism.

In particular, border crossing points primarily serve a control function. They constitute a selective barrier to the movement of people and goods. On the other hand, they are also gateways facilitating international trade (Anderson and O’Dowd, 1999; Davis and Friske, 2013; Phillips, 2005). Borders typically have a greater effect on passenger travel than on freight transport (Rietveld, 2012), requiring that vehicles stop *en route* (Khan, 2010; Miltiadou et al., 2017). This contributes to the development of retail and service outlets in the immediate vicinity of these border crossings, from food businesses to commercial services, as well as external customs, insurance and financial services such as currency exchanges. Increased traffic may accelerate the development of these businesses, but, simultaneously, opening up a border and eliminating the requirement for vehicles to stop may result in the closure of some service outlets. A decrease in border effects is typical for bordering EU countries undergoing integration (Rietveld, 2012).

The barrier and contact functions of a border cannot be separated: borders divide two political, social and economic systems, but they also bring them into contact with one other (Popescu, 2011; Prescott and Triggs, 2008). Border crossings or, more broadly areas which allow the crossing of national boundaries, are fundamental elements that enable the socio-economic merging of border areas. This is directly reflected in the way that surrounding areas are managed and how economic activity develops in these places.

The symmetry vs. asymmetry framework is a vital tool in examining neighbouring border areas and trans-border relations (Dołzbłasz and Raczyk, 2017; Holly et al., 2003). The problem of trans-border cooperation is discussed often in the existing literature, but another relevant element is trans-border mobility, for example in terms of the fulfilment of service and shopping-related needs. When examining experiences at various border areas across Europe, it becomes clear that consumers prefer to fulfil

their elementary shopping needs in their home countries. Differences in availability and pricing, as well as the cultural aspects of any given product, are the only incentives to cross a border in order to make a purchase (Studzińska et al., 2018; Szytniewski et al., 2017). This phenomenon – of high levels of economic independence on both sides of a border – can be observed even in border areas where two countries have long-standing EU cooperation, or in places where the border is not a significant physical or cultural barrier (Bygvrå and Westlund, 2004).

Nevertheless, the phenomenon of consumer mobility is commonly observed across political borders in frontier regions. Trans-border flows, which are directly associated with the existence of a border, have a practical dimension and material output in, among other areas, spatial management and service function development in borderlands. There are two opposing tendencies that simultaneously increase and decrease consumer mobility. Trans-border flows are increased by ‘pull factors’ such as attracting a neighbouring populace to a different country, and ‘push factors,’ which motivate people to leave their home country. There can be some reductions by ‘keep factors,’ which discourage the populace from leaving their home country, and ‘repel factors,’ which discourage people from visiting a neighbouring country (Spierings and Van der Velde, 2008). Many studies have confirmed that notable physical and psychological differences between populations on different sides of a border can have a negative impact on cross-border interaction (Van Houtum, 1999). Cross-border mobility, however, is often stimulated by the attractiveness of an area that is located on the other side of a border, and ideas to visit that area in order to experience something new and different. For this reason, efforts to diminish the dividing role of a border – although they are often positive and result in increased integration – paradoxically contribute to decreased interest in visiting a neighbouring country because of the lack of novelty (Spierings and Van der Velde, 2008).

These various effects can also be accompanied by a ‘blurring’ of the differences between border areas that reduces incentives to cross the border. As Leimgruber (2005, p. 245) points out, cross-border shopping practices are commonly asymmetric, which is a consequence of the differences between one side of the border and the other. More importantly, however, these differences are not static and are subject to change.

Studies on the presence of service facilities in the vicinity of border crossings (conducted as part of this research) are one part of the larger discussion about how state boundaries can have impacts on the phenomena that accompany cross-border mobility. Our current multi-year research project, which examines the number of such services as well as their typological structure, allows us to identify and evaluate changes over time in the symmetries and asymmetries at the Polish-Czech border. These changes are the result of the evolution of the conditions surrounding the border and the role it plays as a barrier.

3. Materials and methods

The field studies, which are based on a consistently-worded instrument, were conducted in 1995, 2000 and 2016 and encompassed 18 border crossings and the Cieszyn/Český Těšín town centre (Tab. 1).

The 1995 study included 18 border crossings that were only accessible to passport-holding pedestrian or automobile

Important dates and the year that research took place (in bold)	Description of border permeability from the points of view of Polish and Czech citizens
1988: Abolition of socialist restrictions on Polish citizens obtaining passports	Partially closed border, accessible only with permits/visas
1990: First democratic Parliamentary elections in Czechoslovakia	
1991: Polish-Czechoslovak agreement on visa-free travel (abolishing the requirement for an invitation or visas to cross the border) and first democratic Parliamentary elections in Poland	The border is open at border crossings only for people with passports; customs restrictions on the transport of goods remain until 2004
1993: Peaceful dissolution of Czechoslovakia into the Czech Republic and Slovakia	
1995: First series of field studies	
1996: Polish-Czech agreement to open new, small border crossings for borderland inhabitants and tourist border crossings on hiking and cycling routes	
2000: Second series of field studies (panel research)	
2004: Polish and Czech accession to the European Union	Abolition of customs controls
2005: Schengen Agreement signed by Poland and the Czech Republic	
2007: Abolition of permanent border control in the borderlands analysed in this study	Abolition of permanent passport control, allowing people to cross the border at any point (excluding locally restricted areas, such as nature reserves and roads closed to the public)
2016: Third series of field studies (panel research)	

Tab. 1: Chronology of the research on border crossing/services in the context of major historical events affecting border permeability (see Section 4)

Source: Compiled by the authors using historical data

traffic (and thus accessible to researchers from further afield without the need for additional permits). For the subsequent study years, the authors used a panel research method: no new border crossings (opened after 1995) were included, because we wanted to ensure long-time data comparability¹. The western part of the analysed border is located in the Sudetes (Sudety Mountains), which form a natural barrier and are characterised by a relatively low population density (Fig. 1). The eastern part is located in the lowland industrial region of Silesia and has the highest population density in this study area. The eastern edge of the area is located in the Beskid Mountains (Beskidy).

Two former passport border crossings in the centre of the divided city of Cieszyn/Český Těšín (at the Wolności bridge and the Przyjaźni bridge, respectively) were excluded from our detailed analysis because they are completely different kinds of border crossings. They are located in the centre of a city that was artificially divided by a border after World War I. For this reason, they are located in completely different surroundings than the other crossings, which are most commonly located in rural or extra-urban areas (sometimes near towns), as well as mountainous regions. Moreover, although the two border bridges in Cieszyn/Český Těšín are located only 500 metres from one another, they were once formally treated as one border crossing with two one-way passages; currently, they constitute two separate, two-way crossings. Consequently, in order to make the study data comparable, the Cieszyn/Český Těšín border crossing points were not taken into consideration in the main analysis; however, some data about this divided city are incorporated into our results section.

The number of service establishments that provided commercial, gastronomic and other types of services (located in buildings or making use of mobile stands, etc.) have been documented within a 500-metre radius of the border control zone, since control typically occurred in the vicinity of, but not precisely on the geographical border. This study exclusively involved areas linked by roads. All types of service facilities were documented and classified according to three major research categories used by the authors:

- Retail outlets: classified into non-durable locations (such as mobile stands and easily movable kiosks), durable grocery and general stores, durable industrial stores and other durable locations (specifically, large-area stores like hypermarkets², wholesale stores, shopping malls, marketplaces and car dealerships).
- Gastronomic facilities: classified into standard eating places (e.g. restaurants, bars, cafés offering confections) and small ones, most of which are non-durable (e.g. mobile fast food and grill stands, small corner shops, and locations such as hot-dog counters in grocery stores).
- Other service establishments: defined as any business-related, professional or governmental facility providing substantial services and involving direct contact with clients. These were classified as follows: 1) finance (e.g. currency exchange booths, bank branches, private customs services); 2) insurance (e.g. insurance broker points); 3) culture, recreation and tourism (e.g. tourist information and travel agencies, hotels, private accommodation, culture centres and museums, sport centres); and 4) other (e.g. public administration, schools, civic associations, post offices, medical services, fuel stations, etc.).

¹ This work expands upon and refines the 2000 analysis by Furmankiewicz (which was published in Polish), using data on border crossings that were collected as part of his master's thesis (Furmankiewicz, 1996), as well as similar work by one of the co-authors of this article (Buryło, 2017).

² The Polish Act, which relates to the creation and operation of large-format commercial facilities, defines hypermarkets as stores with an area of trade larger than 400 square metres.

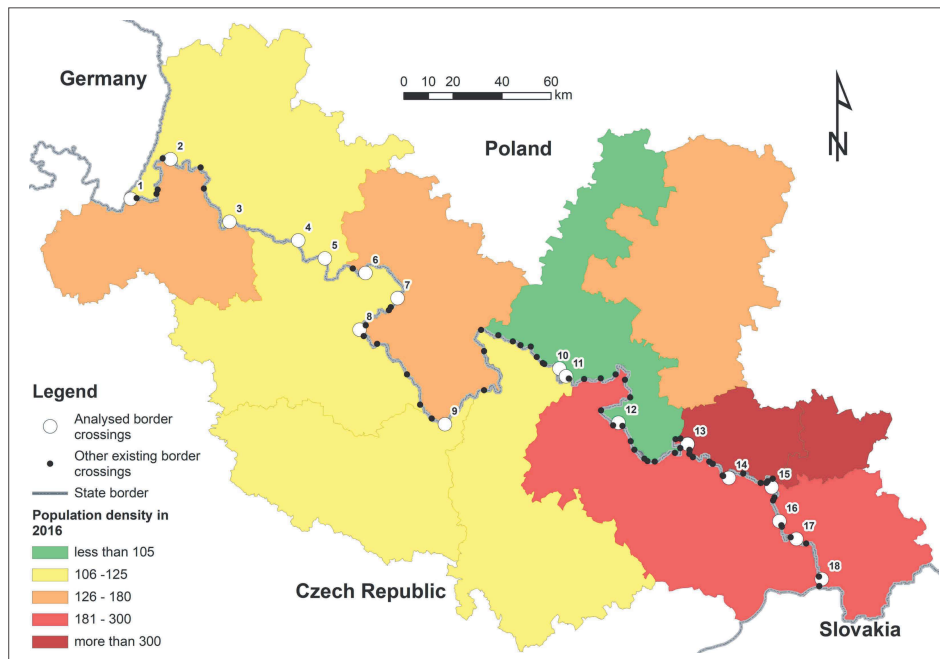


Fig. 1: The areas that were analysed, border crossing points as of 2016 and population density in border regions in 2016. Source: authors' elaboration

Note: Analysed border crossings: 1. Porajów (PL) – Hrádek nad Nisou (CZ); 2. Zawidów (PL) – Habartice (CZ); 3. Jakuszyce (PL) – Harrachov (CZ); 4. Przełęcz Okraj (PL) – Malá Úpa (CZ); 5. Lubawka (PL) – Královec (CZ); 6. Golińsk (PL) – Starostín (CZ); 7. Tłumaczów (PL) – Otovice (CZ); 8. Kudowa–Ślone (PL) – Náchod–Běloves (CZ); 9. Boboszków (PL) – Dolní Lipka (CZ); 10. Głuchołazy (PL) – Mikulovice (CZ); 11. Konradów (PL) – Zlaté Hory (CZ); 12. Pietrowice (PL) – Krnov (CZ); 13. Pietraszyn (PL) – Sudice (CZ); 14. Chałupki (PL) – Bohumín (CZ); 15. Markłowice (PL) – Petrovice u K. (CZ); 16. Cieszyn–Boguszowice (PL) – Český Těšín–Chotěbuz (CZ); 17. Leszna Górna (PL) – Horní Lištná (CZ); 18. Jasnowice (PL) – Bukovec (CZ)

The analysis included only those facilities that were available to customers on site, excluding any private or state company headquarters. We also excluded ski-lift services that are available near four of the mountain border crossings included in the study, since these are not associated with typical border traffic and only operate seasonally.

The authors made use of the ArcGIS program for data visualisation. Spatial analyses were conducted using the NUTS 3 EU statistical unit areas (noted in Fig. 1), some of which extend as far as 25 kilometres away from the state border. The number of roads available for motor vehicles in 2016 was calculated using cartographic material: Ortofotomap, the Open Street Map database and Google street view, without taking into account local restrictions on vehicle tonnage.

4. Background: The permeability of the Czech-Polish border from 1988 to 2016

The Polish-Czech border is 796 kilometres in length (Statistics Poland, 2011), 80% of which is located in the middle of mountainous areas. Regardless of the political context, orographic and natural determinants (for example, mountain ridges or river valleys that include a significant number of protected natural sites) have always played a significant role in limiting transport infrastructure development and border permeability for automobile traffic (Kolejka et al., 2015). Environmentally valuable areas, however, have also contributed to increased tourism development (Dołzbłasz, 2017; Furmankiewicz et al., 2019; Krajewski, 2019; Potocki et al., 2014; Przybyła and Kulczyk-Dynowska, 2017).

The borders in this part of Europe experienced significant changes after World War II. In 1945, the former border between Czechoslovakia and Germany, which covered

a long section of the Sudetes, became the Czechoslovakian-Polish border (Böhm and Šmída, 2019; Dołzbłasz, 2017; Eberhardt, 2017). There was almost no border permeability during the socialist period and, for a long time, the border was almost completely sealed off and protected on the Polish side by the Border Protection Forces, which existed until 1991. Various types of restrictions were applied to border areas during this period (the changes that took place between 1945 and 1988 are not the subject of this research: see Rychlík (2016), for example, for more detailed information). Using terminology established by Martínez (1994), it can be argued that the borderlands in question were 'alienated' or, periodically, 'coexistent.' Polish citizens could legally obtain a long-term passport that was valid worldwide since 1988.

The fall of socialism and the onset of democratic elections in Czechoslovakia (in 1990) and Poland (in 1991) coincided with the signing of the Polish-Czechoslovak Agreement on visa-free travel in 1991. This agreement, which removed any requirement for persons to have special permits or visas to be able to cross the border, had a significant impact on cross-border travel. After the peaceful division of Czechoslovakia into the Czech and Slovak Republics in 1993, this agreement was maintained. In 1991, there were only 11 passport border crossing points available for automobile traffic on the Polish-Czechoslovak border; by 1995, there were 19 passport crossings and 26 additional local border crossings without extensive infrastructure (intended for those who lived in these borderlands).

Throughout the 1990s, EU PHARE pre-accession support programs have proved to be of great significance for border areas, which had previously been underdeveloped due to their peripheral locations and to other legal restrictions,

because these programs co-financed the construction and modernisation of roads and other local public infrastructure (Ciok, 2003).

In 1996, a new local border traffic agreement took effect. This agreement allowed residents of municipalities within 15 kilometres of the border to cross it using only their national identification cards, and to stay abroad for up to seven days. That same year, a number of passport border crossings that were part of tourist routes began to open up, offering access to pedestrians, as well as to some skiers and cyclists. By 2000, there were 22 road passport crossings, 30 local border traffic crossings and 20 small border crossings on mountain hiking and cycle tourist routes (most commonly in mountain regions). This period also represents an increase in the number of ‘interdependent’ borderland features according to the typology developed by Martinez (Komornicki, 1999; Stryjakiewicz, 1998).

In 2004, both countries joined the EU, resulting in the abolition of customs controls, leaving only passport checks. It also significantly increased the possibility of obtaining additional EU funding for the modernisation or construction of new infrastructure in peripheral border areas (Ciok and Raczyk, 2008; Dołzblasz, 2013; Kachniarz et al., 2019; Rosik et al., 2015). In 2007, when Poland and the Czech Republic joined the Schengen area, passport controls were abolished and the control infrastructure at border crossing points was decommissioned (Directorate-General for Migration and Home Affairs, 2015). Borders ceased to be a barrier limiting the movement of people and vehicles, with the only exceptions being temporary controls that may be introduced in the case of epidemics, in order to ensure security for interstate summits, or for other special events (Kolosov and Więckowski, 2018).

Moreover, it was now legal to cross the border anywhere, with the exception of areas where pedestrian or automobile traffic was prohibited for other reasons, for example on designated routes within nature reserves or national parks. As a result of these formal facilitations and investments from local governments, the number of paved roads allowing border crossing increased significantly after 2007. The total number of points where motorists could legally cross the Polish-Czech border increased from nine to 83 between 1991 and 2016 (see Tab. 2). Border permeability, measured by the number of crossing points per 100 kilometres of borderline, increased from about one in 1991 to two in 1995 and 10 in 2016. An increase in other kinds of cross-border connections was also observed, due largely to stronger cooperation between local communities and the public administration in functional areas that were divided by national borders (Dołzblasz and Raczyk, 2010; Böhm and Drápela, 2017; Kurowska-Pysz and Szczepańska-Woszczyzna, 2017; Potocki et al., 2014).

Year	1991*	1995*	2000	2016
Number of border crossings	9	19	22	83
Border permeability rate	1.13	2.38	2.76	10.42

Tab. 2: Number of Polish-Czech border crossings and border permeability rate (measured in number of crossings per 100 km, accessible for car)

Note: *The Okraj mountain pass – exclusively accessible to bicycles and pedestrians until 1998)

Sources: Compiled by the authors using data from the Polish Ministry of the Interior and Administration and from cartographic sources

The changes described above – which are both political (the conditions of crossing the border) as well as organisational (the number of border crossings or places offering passage across the border) – undoubtedly had a significant impact on Polish-Czech cross-border vehicle and pedestrian traffic. Unfortunately, there are no comparable data regarding cross-border traffic post-2007, when all controls had been abolished. Data from the primary international routes suggest, on the one hand, an increase in car traffic (Jurczek, 2002; Potocki et al., 2014) and, on the other, a dispersion, due to the introduction of a large number of new roads offering passage across the border (Kolejka et al., 2015). These changes have also had a strong influence on the development of service facilities located at former border crossings, although a detailed analysis of the Polish-Czech border has not yet been conducted, at least in any English-language research findings. By investigating long-term changes at former formal border crossings, this article fills this gap in the literature.

5. Results: Services in the vicinity of border crossings from 1995 to 2016

The following section contains the results of field studies conducted at 18 border crossings in the years 1995, 2000 and 2016. The tables and figures show only aggregated data. Between 1995 and 2000, the increase in cross-border traffic and the fact that border crossings retained their control functions, led to a spike in the number of trading facilities on both sides of the border (see Fig. 2). At the same time, there was a slight decrease in the number of small gastronomic establishments on the Polish side of the border and an increase on the Czech side (Fig. 3); while the number of facilities providing other types of services showed a slight increase (Fig. 4).

The highest growth levels observed during the 1995–2000 period involved trade, gastronomy and other services offered at border crossings located in towns adjacent to the border, suggesting that it was not transit traffic, but local shopping traffic that played the most significant role in services development. During that period, it was convenient for Poles to purchase alcohol and some food at lower prices in the Czech Republic, and for Czechs to acquire certain industrial goods, such as furniture or bedding, in Poland. The specific customs limitations (which limited the amount of goods that could be transported per capita during a single cross-border visit), coupled with there being no limitation on the number of times one could cross the border, led to a rise in small-scale smuggling, mostly with regard to alcohol (because people crossed the border multiple times with smaller amounts of goods that did not exceed the legal limit). The relatively high cost of compulsory international car insurance also encouraged Poles to leave their vehicles at a border crossing parking lot, and to walk to the Czech side of the border to do their shopping. This led to a significant growth in small grocery stores on the Czech side.

The occasional customers, as well as the small-scale smugglers who spent a relatively longer amount of time near the border crossing, had a stimulating effect on the development of small, non-durable gastronomy establishments (in particular for Polish shoppers on the Czech side of the border), and currency exchange booths (in particular for Polish shoppers and alcohol smugglers buying Czech currency). This was especially true at the Marklowice/Petrowice, Chałupki/Bohumín and Zawidów/Habartice crossings and at the urban crossing in Cieszyn/

Český Těšín (which, in reality, was comprised of two bridges allowing one-way traffic). Another factor which impacted the development of borderland services was transit traffic, for example, when a border crossing was part of an international or state road. This was the case of the Chałupki/Bohumín and Kudowa Słone/Náchod Běloves crossings. Services provided at crossings that were located further from the nearest town were much less developed, even if they were part of transit roads (e.g. Jakuszyce/Harrachov, Międzyzlesie/Lichkov). Most often, they comprised a small number of non-durable kiosks that were easy to relocate; examples include Porajów/Hrádek n. Nisou, Jakuszyce/Harrachov, Boboszków/Dolní Lipka, Głuchołazy/Mikulovice, Konradów/Zlaté Hory, Pietrowice/Krnov, Pietraszyn/Sudice and Górna Liszna/Horní Líštná.

The Czech side of the border generally offered more outlets providing a greater variety of services. Transporting large-size industrial goods – something of great interest to Czech customers – required the use of automobiles and large-area stores, so Czechs usually preferred to visit towns

closest to the Polish side of the border, leading to much poorer development of trade outlets near these border crossings. Other services were of less importance, but they were usually better developed on the Polish side: these included insurance branches and freight business offices. Such services would most commonly prosper at crossings located in borderland towns.

Between 2000 and 2016 the number of retail centres dropped to levels below those of 1995 on both sides of the border. This was mostly a result of a decline in grocery stores, primarily due to a gradual decrease in the affordability of transporting alcohol to Poland and the wide availability of tax-free wholesale shopping (because the ease of cargo transport led to the complete eradication of small-scale smuggling). The largest decrease in the number of retail points was observed on both sides of the Zawidów/Habartice and Chałupki/Bohumín crossings, and mainly on the Czech side of the Lubawka/Královec, Golińsk/Starostín and Kudowa Słone/Náchod Běloves crossings.

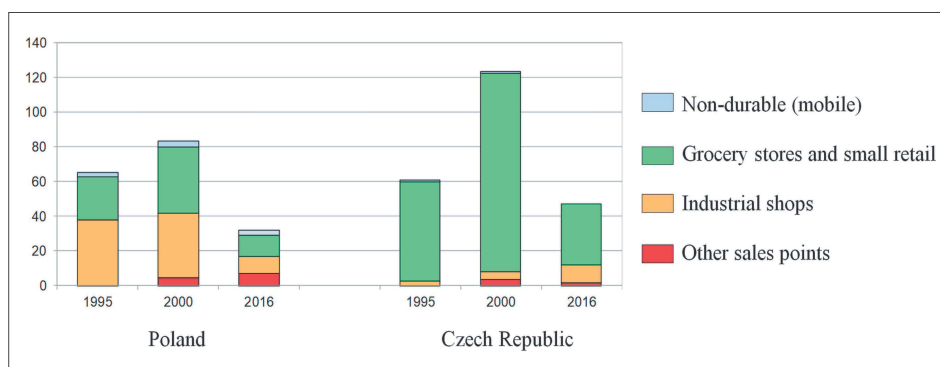


Fig. 2: Number of commercial outlets at Czech-Polish border crossings (excluding the Cieszyn/Český Těšín centre) Source: authors' field research

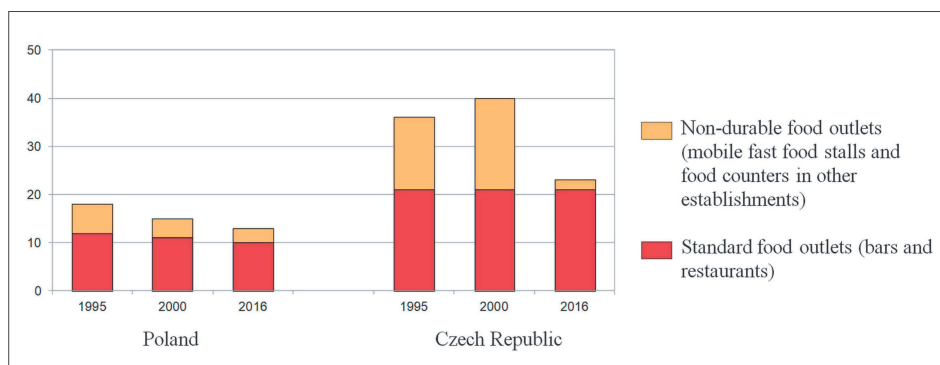


Fig. 3: Number of gastronomic facilities at Czech-Polish border crossings (excluding the Cieszyn/Český Těšín centre) Source: authors' field research

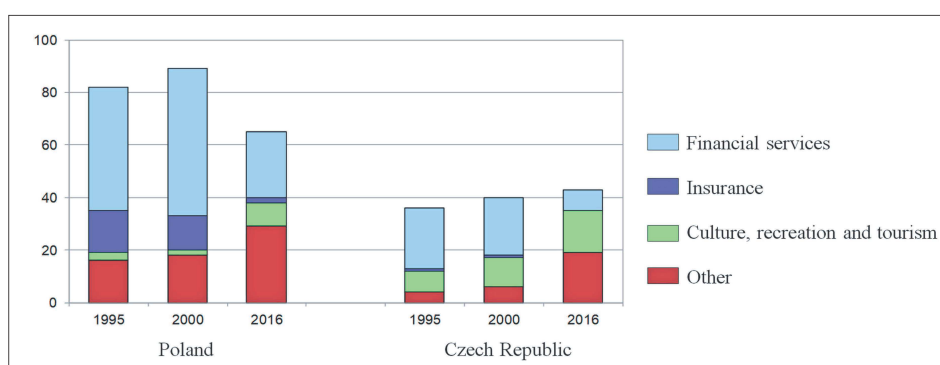


Fig. 4: Number of other service establishments at Czech-Polish border crossings (excluding the Cieszyn/Český Těšín centre). Source: authors' field research

Between 2000 and 2016, there was also a decline in small, usually non-durable, fast-food outlets in the areas we studied, with practically no such decrease noted for higher-level gastronomic establishments.

There was an increase in facilities on the Czech side of the Zawidów/Habartice and Okraj pass/Malá Úpa crossings in the Sudetes, which may be the result of increased tourist traffic. The number of currency exchange booths and insurance companies has also decreased. Customs-related services have also dwindled (given the fact that fewer documents need to be filled out), with only a few still remaining at border crossings with the highest cargo traffic. The most

diverse array of service outlets was at crossings located near towns and large villages (e.g. Zawidów/Habartice, Kudowa Słone/Náchod Běloves, Chałupki/Bohumín). One interesting case is that of the Kudowa Słone/Náchod Běloves crossing, which is located on the international E67 road. This crossing experienced almost all of the changes described here: a decrease in the number of small trade, gastronomic and financial outlets, along with the establishment of a large-area store on the Czech side (see Fig. 5).

Most other types of services were those that had no direct relation to the border crossings themselves, rather they encompassed services for the local inhabitants of borderland

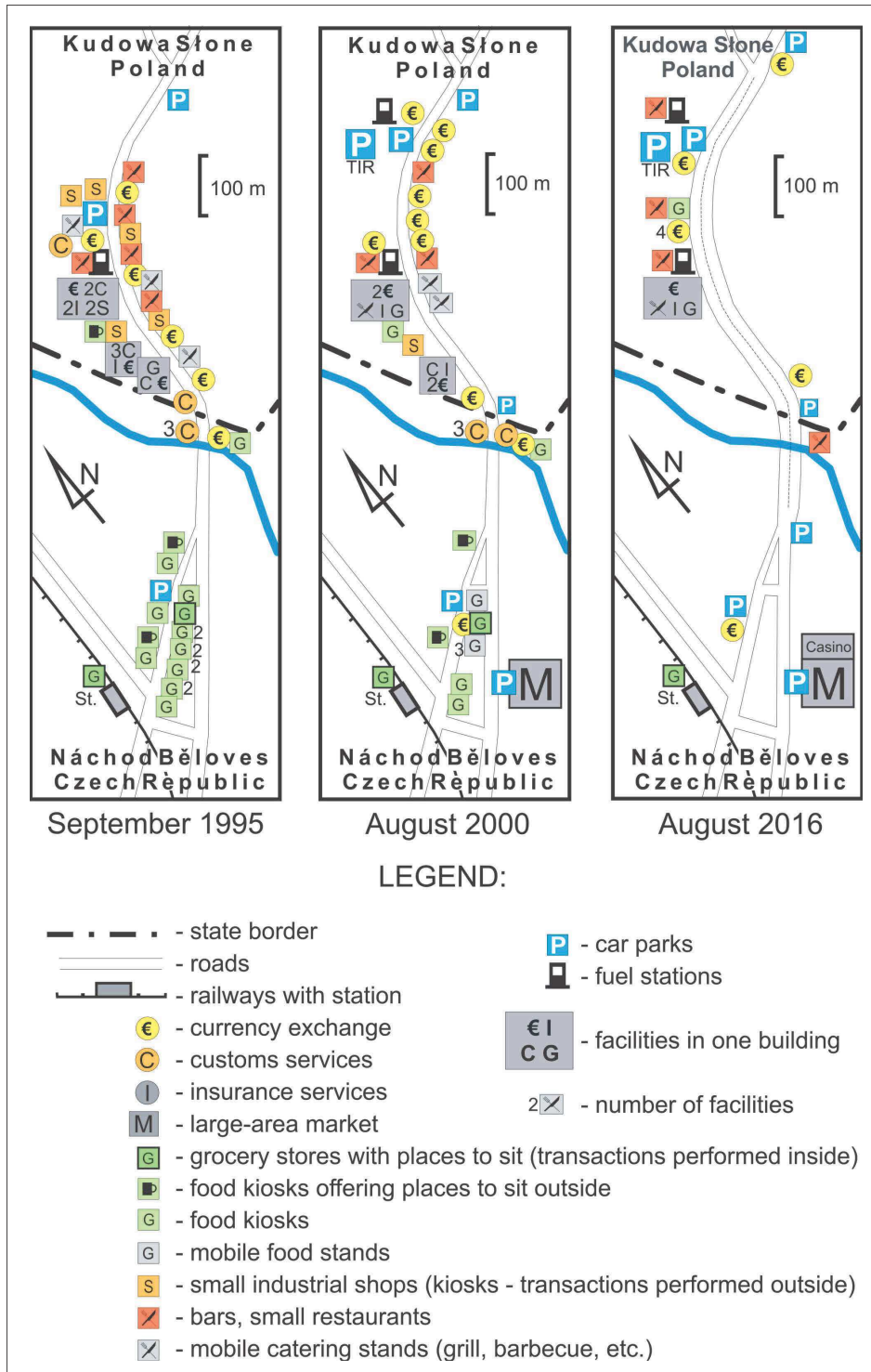


Fig. 5: Service establishments at the Náchod Běloves/Kudowa Słone border crossing in 1995, 2000 and 2016 (schematic plan). Source: compiled by the authors from Furmankiewicz (2000) and Buryło (2017)

towns, such as post office branches, banks, schools and pre-school institutions, craftsmen and local associations. In this category, the number of non-financial and non-insurance services at the border crossings under review has also increased, with a rise in the number of service facilities related to culture, recreation and tourism on both the Czech and Polish sides.

We do not have fully comparable data on border crossings in the centre of Cieszyn/Český Těšín. Available data relate to the total number of outlets within 500 metres of either border bridge. These data suggest that, between 1995 and 2016, the number of permanent catering establishments (bars and restaurants) increased on both sides of the border (in Poland from about 17 to 45, in Czech Republic from about 21 to 26). At the same time, there was a significant decrease in the number of small, non-durable (including mobile) outlets. The number of retail outlets has dropped significantly on both sides of the border, primarily due to the decrease in small industrial stores, which was more significant on the Polish side of the border (while at crossings described earlier, the decrease was also important, but it was seen among grocery stores as opposed to industrial stores, since the latter were not present at those crossings). Asymmetric changes also took place with regard to financial institutions: Poland saw a decrease from around 23 to two, while Czech Republic saw an increase from around six to eight. Insurance services had negligible significance, with only one branch on the Czech side in 2016. On the other hand, as with the other border crossings we analysed, the number of service facilities related to recreation, sport and tourism increased both in Poland (from about three to 12) and Czech Republic (from about four to seven).

Our results suggest a clear diversification in terms of economic activity in the vicinity of border crossings by 2016. The authors have therefore established a simple typology

of border crossings with regard to the three categories of services that were analysed: retail, gastronomy and other service functions (see Tab. 3). The ‘commercial function’ applies when a total of two or more retail outlets were located on both sides of a former crossing. The ‘gastronomy function’ applies when there were more than two outlets in this category and the ‘other service function’ applies when there were more than four outlets of this kind. Border crossings that had no assigned function were named ‘corridors’ (type C), because their main purpose was to enable transport to a neighbouring country. Those with one or two functions were designated as areas with low levels of service development (type L). Finally, those with all three functions were identified as multifunctional areas servicing travellers (type M).

In 2016, based on this typology, 10 of the border crossings under evaluation served exclusively as transport corridors, offering no significant service functions (type C). The majority of these were located in mountain regions (seven in the Sudetes and two in the Beskids), with only one being located in the Silesian Lowlands (see Fig. 6). Almost all crossings of this type were located at a distance from borderland towns, with two of them being part of international roads. A low level of development in service functions (type L) was observed at three crossings: two were characterised by structures that made them part of local villages that abutted the state border; and one was a travellers’ service station on an express road (Cieszyn-Boguszowice/Český Těšín-Chotěbuz). Five crossings were assigned the multifunctional (type M) category: four were located in small towns adjacent to the border (on both the Polish and Czech sides); one – the Okraj pass/Malá Úpa – was connected to the mountain tourist village of Malá Úpa in the Krkonoše/Karkonosze Mountains. The two border crossings in Cieszyn/Český Těšín centre were characterised by the highest number and diversity of service establishments and were thus classified as “type M.”

No	Analysed border crossing area	Commercial functions	Gastronomic functions	Other service functions	Type
1	Porajów (PL) – Hrádek nad Nisou (CZ)	YES	YES	YES	M
2	Zawidów (PL) – Habartice (CZ)	YES	YES	YES	M
3	Jakuszyce (PL) – Harrachov (CZ)	NO	NO	NO	C
4	Przełęcz Okraj (PL) – Malá Úpa (CZ)	YES	YES	YES	M
5	Lubawka (PL) – Královec (CZ)	NO	NO	NO	C
6	Golińsk (PL) – Starostín (CZ)	YES	YES	NO	L
7	Thumaczów (PL) – Otovice (CZ)	NO	NO	NO	C
8	Kudowa-Słone (PL) – Náchod-Běloves (CZ)	YES	YES	YES	M
9	Boboszków (PL) – Dolní Lipka (CZ)	NO	NO	NO	C
10	Głuchołazy (PL) – Mikulovice (CZ)	NO	NO	NO	C
11	Konradów (PL) – Zlaté Hory (CZ)	NO	NO	NO	C
12	Pietrowice (PL) – Krnov (CZ)	NO	NO	NO	C
13	Pietraszyn (PL) – Sudice (CZ)	NO	NO	NO	C
14	Chałupki (PL) – Bohumín (CZ)	YES	YES	YES	M
15	Marklowice (PL) – Petrovice u K. (CZ)	YES	NO	NO	L
16	Cieszyn-Boguszowice (PL) – Č. T. – Chotěbuz (CZ)	YES	NO	YES	L
17	Leszna Górna (PL) – Horní Líštná (CZ)	NO	NO	NO	C
18	Jasnowice (PL) – Bukovec (CZ)	NO	NO	NO	C

Tab. 3: Proposed typology for the former border crossings under evaluation, with regard to current (2016) development of retail and service establishments

Source: authors’ field research

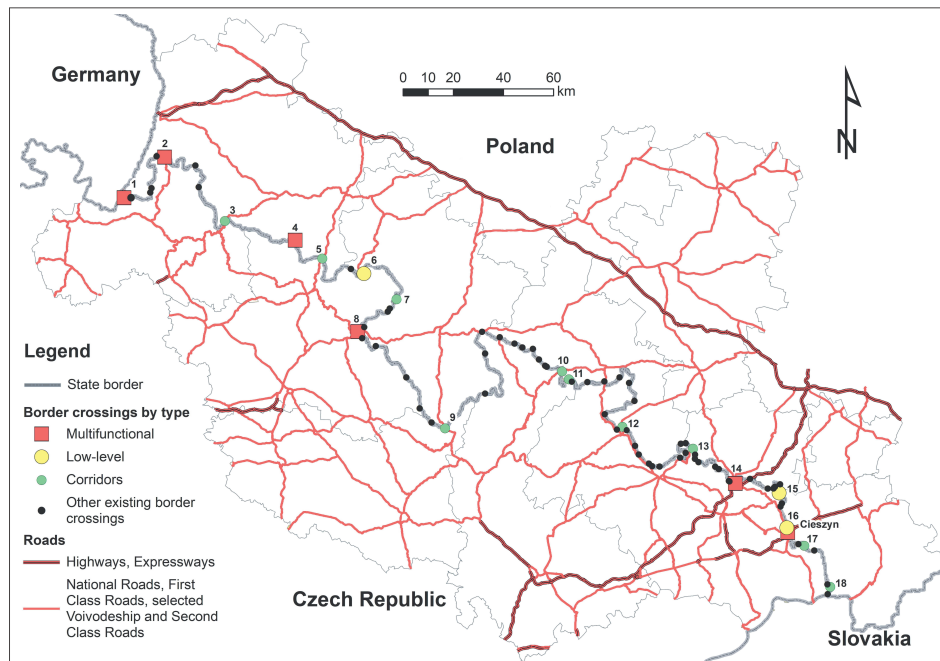


Fig. 6: The current typology of analysed border-crossing points (2016). Source: authors' field research

Note: Analysed border crossing points: 1. Porajów (PL) – Hrádek nad Nisou (CZ); 2. Zawidów (PL) – Habartice (CZ); 3. Jakuszyce (PL) – Harrachov (CZ); 4. Przełęcz Okraj (PL) – Malá Úpa (CZ); 5. Lubawka (PL) – Královec (CZ); 6. Golińsk (PL) – Starostín (CZ); 7. Tlumaczów (PL) – Otovice (CZ); 8. Kudowa–Stone (PL) – Náchod–Běloves (CZ); 9. Boboszków (PL) – Dolní Lipka (CZ); 10. Głuchołazy (PL) – Mikulovice (CZ); 11. Konradów (PL) – Zlaté Hory (CZ); 12. Pietrowice (PL) – Krnov (CZ); 13. Pietraszyn (PL) – Sudice (CZ); 14. Chatupki (PL) – Bohumín (CZ); 15. Markłowice (PL) – Petrovice u K. (CZ); 16. Cieszyn–Boguszwice (PL) – Český Těšín–Chotěbuz (CZ); 17. Leszna Górna (PL) – Horní Líštná (CZ); 18. Jasnowice (PL) – Bukovec (CZ).

6. Discussion

Our analysis shows that, between 1995 and 2016, there was a decrease in the total number of service outlets in the vicinity of all Czech-Polish border crossings, whether in rural or urban areas. The reasons for these changes, however, are diverse and depend on a number of local determinants. Table 4 summarises our evaluation of the impact of certain factors on the growth or decline of certain types of service outlets at these border crossings.

The abolition of customs and passport controls removed the need to stop at the border. It also eliminated small-scale smuggling, which had stimulated the development of

certain services prior to 2004. This was especially true for a number of small retail outlets that had benefitted from both smuggling and from shoppers seeking out better prices for goods on the other side of their own state border (Tab. 5). Price differences are a common factor in the stimulation of cross-border shopping (Cosaert, 1994; Fullerton and Walke, 2019; Powęska, 2008).

Due to a lack of control and price equalisation, border shopping intensity has decreased significantly and small shops that previously thrived at border crossings have closed. Both countries have also experienced a decline in the number of small grocery stores and convenience stores, as a result of

Factor affecting the development of services	Type of services				
	Retail	Gastronomy	Finance	Insurance	Culture, recreation, tourism
Traffic de-concentration resulting from the introduction of new border crossings	–	–	–	–	–
Traffic increases resulting from the abolition of border controls	+	+	+	+	+
Elimination of customs barriers	+	0	0	0	0
Levelling of the prices of goods as a result of integration	–	0	–	0	0
Electronic banking	+	0	–	–	+
Compulsory insurance valid across Europe	0	0	0	–	+
Introduction of large-area store networks, resulting in decreases in small retail outlets	–	0	0	0	0
Total result (growth/low influence/decline for given type of outlet in the border area)	decline	low influence	decline	decline	growth

Tab. 4: Evaluation summary of the impact of certain factors on the growth (+), decline (–) or stagnation (0) of certain types of service outlets located in the vicinity of border crossings. Source: authors' field research

Category or country		Year	
		2000	2016
Alcoholic beverages	CZ	60,2	84,7
	PL	107,3	83,4
	Difference	– 47,1	1,3
Furniture and furnishings, carpets and other floor coverings	CZ	74,4	71,7
	PL	68,4	72,5
	Difference	6,0	– 0,8
Restaurants and hotels	CZ	48,0	56,2
	PL	70,1	70,8
	Difference	– 22,1	– 14,6

Tab. 5: Price level indices (EU27, 2007 = 100) in Poland and the Czech Republic from 2010 to 2016 for select product categories (no data before 1999; acronyms: CZ – the Czech Republic; PL – Poland)

Source: Compiled by authors using data available from Eurostat (2020)

the development of large-area store networks and discount stores (Machek, 2012; Twardzik and Heffner, 2019). This may be another reason for the decline in the number of small industrial stores in Cieszyn/Český Těšín. Another important factor may be income growth among Poles and Czechs as a result of recent economic transformation (Fałkowski et al., 2014). This has led, among other factors, to an increase in the number of registered cars in both countries (Kilsilowski and Zalewski, 2010), which has facilitated private transport to nearby border towns that offer a greater diversity and higher standard of services. Income growth has also had a positive impact on tourism development (Więckowski, 2010).

The number of insurance branches and financial outlets (primarily currency exchange booths) has also decreased significantly. The decline in the availability of these services can be attributed to the fact that citizens of these two countries no longer need to purchase so-called ‘green cards’ (international automobile insurance) or extra health insurance when travelling abroad, thanks to the introduction of the European Health Insurance Card. In spite of maintaining national currencies in Poland and the Czech Republic, the growing availability of electronic bank services, such as cashpoints and the ability to pay via debit or credit cards (Ilnicki, 2009), has reduced demand for currency exchanges.

Interestingly, the number of durable gastronomic facilities has generally remained unchanged, with a notable development in such services in the Polish part of Cieszyn/Český Těšín, which offers a historic market square and is a focal point for local tourism and services (Böhm and Drápela, 2017; Dołzbłasz, 2015; Kulczyńska and Matykowski, 2008). The development of tourism – and cross-border tourism in particular – has contributed significantly to maintaining the demand for catering services (Dołzbłasz, 2015, 2017). This is a typical phenomenon in many border areas, especially those located in regions with landscapes and historical sites that attract tourists (Więckowski, 2010; Pawlusiński and Kubal, 2015; Prokcola, 2010).

Another contributing factor to asymmetry in the development of certain establishments on both sides of the border is the difference in infrastructure development and settlement structures in the Polish and Czech parts of the Sudetes. The forced expulsion of Germans between 1945 and 1950, the strict military protection of border areas during the Communist era, and restrictions on borderlands and their peripheral economic locations in the Sudetes, have

resulted in the depopulation and de-capitalisation of some areas. This includes the disappearance of villages, especially on the Polish side of the border (Ciok, 1990; Heffner, 1998; Heldak and Kempa, 2007; Latocha, 2012; Oleszek, 2007; Szmytkie and Tomczak, 2017). As a result, there has been less intensive development of local infrastructure in the Polish Sudetes, which in turn has limited the establishment of service facilities near mountain border crossings. In the relatively densely populated lowlands of the Silesia-Moravia region (the central-eastern part of the Polish-Czech border), where forced migration processes were less intense, services – however different in structure – more frequently developed on both sides of the border.

The results of the research suggest, primarily, that border shopping is moving away from border crossings to the towns nearest to those crossings. It is also seeing gradual declines as a result of more equitable prices on both sides of the border. In addition, since there is no longer a requirement to stop at the border, there has been a decrease in the number of service facilities dedicated to travellers, while greater levels of accessibility have meant that nearby towns now offer a wider array of services due to existing local demand.

It is probable that borderland tourists, as well as local residents, also make use of the more recently introduced crossings (which were not investigated here) that are more relevant to local movement. Although there has been an increase in cross-border traffic on international routes (Jurczek, 2002; Komornicki, 1999; Potocki et al., 2014), this research indicates that transit traffic has limited impact on services development at border crossing points (for example, certain international roads located outside of urban areas have no services at all). Local traffic is generally of much greater significance in the development of service outlets and may lead to the establishment of new businesses at these new crossing points; however, it can be assumed that this has not happened in part because of the factors described above (the lack of border controls, the shift in demand to nearby cities, price equalisation and the development of electronic payment options). Further studies will be needed to confirm these assumptions.

The majority of former border crossings located outside of towns have become nothing more than transport corridors, offering no significant services. Their growth history has a characteristic pattern (Fig. 7). During the Communist

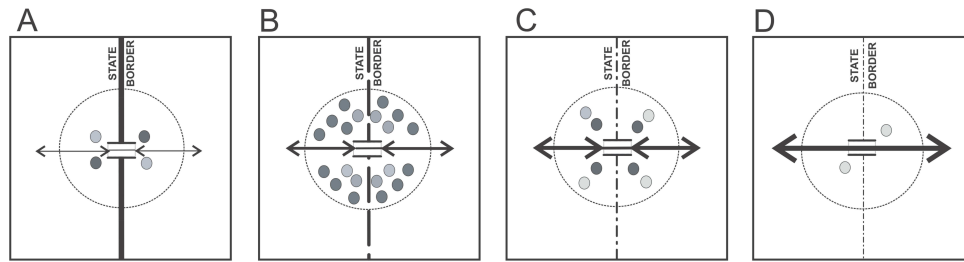


Fig. 7: Evolution of the general patterns of border crossings located outside urban areas. After the border opened, crossings usually function exclusively as transport channels, offering no significant services. See the text for further explanation. Source: based on authors' field research

era, although there was a small number of border crossings, travel was limited. This meant that very few service facilities were developed at border crossings (Stage A). As freedom of movement increased – obtaining a passport was easier, there were no requirements for visas and there was an increase in trade contacts – these crossings, which still maintained border controls, saw their maximum levels of growth in terms of service outlets (Stage B). Removing customs barriers while maintaining passport control resulted in a slight decrease in the number of service outlets (Stage C). Finally, eliminating all border controls and removing the need to stop at the border crossing led to the most significant decrease in services offered there (Stage D). This is similar to several models proposed by other authors (e.g. Ciok, 1990, p. 14; Martinez, 1994, p. 7), but our focus is on services development at border crossings that are not within cities or villages.

In this context, the so-called ‘tunnel effect,’ observed at former transit border crossings such as Jakuszyce/Harrachov and Cieszyn-Boguszowice/Český Těšín-Chotěbuz, is also relevant. High intensity cross-border transport passages on highways and express routes that have no border control allow for a practically seamless border crossing. One such example is the A-1 Highway, which was created after the countries entered the Schengen area; this crossing point has no travellers' service station at the Polish-Czech border and no border control infrastructure.

It would be beneficial to compare the results of this study with data related to borders in Europe, but the authors are unaware of any other publicly available multi-year comparisons of changes in the structure and number of service outlets located in the vicinity of former border crossings. The findings here undoubtedly mirror the experiences of those in Western and Northern European states (Prokkola, 2010; Szytniewski et al., 2017), which began eliminating border controls much earlier than post-socialist countries (the Schengen area was created in 1985). Similar asymmetric changes at crossing points have been observed on the Franco-Belgian border by Cosaert (1994); other research shows that, in cases of borders being opened, shopping tends to concentrate in neighbouring towns and villages (Szytniewski et al., 2017; Dołzbłasz and Zelek, 2019), while former border crossings serve mainly as transit routes (Prokkola, 2010).

The Polish-Czech border transformations detailed in this study have also been reinforced by changes in the pull/push and keep/repel factors. Some pull factors have declined – the high differences in prices, for example – as have certain push factors, such as greater accessibility of goods from the neighbouring state in one's own country. The role of recreational tourism, on the other hand, has certainly increased (Dołzbłasz, 2017; Więckowski, 2010),

a finding which is common in the borderlands of other countries undergoing integration processes (Kolosov and Więckowski, 2018; Prokkola, 2010).

7. Conclusions

In large part, the results of this study confirm that the diminishing role of the border as barrier may lead to a reduction in the intensity of certain cross-border interactions. Between 1995 and 2016, there was a sharp decrease in the intensity of shopping at the Polish-Czech border crossings. This is also a question of symmetrical and asymmetrical relations in borderland areas. Our study confirms that increased price equity (e.g. with regard to consumer commodities), introducing universal principles as a result of changes in neighbouring countries (such as customs or European insurance) and general trends (such as the increased availability of electronic payment) lead to increased symmetry on both sides of the border. This may in turn lead to a decrease in cross-border interactions. It should be pointed out that a decrease in relations within a given domain may be accompanied by an increase in another. In the areas we studied, this certainly applies to the development of cross-border tourism and, to a lesser extent, to commuters travelling to or from work (primarily Poles commuting to the Czech Republic).

When analysing the above changes, the authors did not work from the assumption that opening the border was the only factor influencing the type and number of service outlets at former border crossings. The above-mentioned processes related to European integration also affected the types of services in both countries. In order to unambiguously evaluate the impact of the border on local service structure, it would be necessary to compare the changes observed within each country to the changes seen in the borderland areas. This would require additional in-depth studies, as well as a broader regional evaluation.

The changes observed in relation to the manner in which former border crossings function seem to indicate that, in the case of significant integration processes, it is only those crossings located within settlement units (in other words, borderland towns) that are able to transform into multifunctional service areas. Crossings outside settlement areas are most often transformed into little more than transport corridors. This suggests that local and tourist traffic has a greater impact on these transformations than transit traffic. Therefore, after a border ceases to be a barrier, the rationale for where services are located is probably closer to that of classical retail location theories, in which settlement centres of various rank are of greatest importance (Borchert, 1998).

It is evident that towns and cities most often serve as 'generators' for various types of cross-border connections (in fields such as cooperation, trade and tourism). Being located in an area that attracts tourism, which in turn generates cross-border mobility and fosters demand for services, is another element that may be one of the deciding factors in whether a border area maintains or further develops its services (Dołzblasz, 2017). These processes could be considered indicative of the process of European integration (Prokcola, 2010), since it seems that the tendencies observed in former Polish-Czech border crossings are, to a large degree, universal in character, particularly when viewed against the backdrop of the European de-bordering processes that are a result of the EU's governing principles and the creation of the Schengen area. In brief, there is evidence of scalar mechanisms at work here.

The results of our analyses confirm that, as border regions become more integrated, the role of the border as a stimulator of local socioeconomic change decreases. Border areas gradually acquire the features of internal areas. For those working in spatial and economic planning, it is therefore worth applying methods more typical for the support and development of settlement centres, which are natural service centres. On the other hand, cultural and ethnic differences may still stimulate the development of tourism, which is highly important on the Polish-Czech border, given the physical and geographical characteristics of the region, as a significant part of the border is in mountain regions or includes natural and historic attractions. For local governments, it is therefore worth paying special attention to the promotion and creation of infrastructure taking into account tourism from neighbouring countries.

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Fig. 8: Art gallery in the building of the former border crossing Jasnówice (PL) – Bukovec (CZ) in 2016 (Photo: K. Buryło)



Fig. 9: Former border crossing Zawidów (PL) – Habartice (CZ) in 2016 (Photo: K. Buryło)