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Impact of Migration and Workforce Diversity on Financial Performance of Firms: Evidence from Bulgaria, Finland and Slovakia

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Abstract

Research background: The relationship between migration-induced workforce variety and corporate financial performance is little studied in Central and Eastern European contexts, particularly from a cross-industry and cross-national perspective.
Purpose of the article: This paper examines the effects of migration-induced workplace diversity on labour productivity in Bulgaria, Finland, and Slovakia—three EU member states with differing migration policy paths and economic structures.
Methods: This study used secondary data obtained from Eurostat for the period 2015 to 2023. The analytical procedures include Pearson correlation analysis, one-way ANOVA, paired Welch t-tests with Bonferroni adjustment, and year-on-year sign scheme concordance analysis.
Findings & Value added: ANOVA revealed that there is a statistically significant difference in the labour productivity growth between the three countries ($F(2, 24) = 5.85$, $p = 0.009$). The correlation analysis showed strong positive correlations between the share of foreign workers and productivity in Bulgaria ($r = 0.95$) and Finland ($r = 0.94$), and a strong negative correlation in Slovakia ($r = -0.81$). The analysis of the sign scheme revealed 75% agreement (6 of 8 years) for BG and FI, but SK showed only 37.5% agreement (3 of 8 years). The study offers context-specific insights for underresearched EU economies across many sectors and personalised suggestions for enterprises and policymakers.

Keywords: workforce diversity; migration; firm financial performance; cross-industry analysis; Central and Eastern Europe

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1. Introduction

Migration and worker diversity have emerged as key elements of EU labour markets; yet, their financial ramifications for companies are contingent on context and subject to empirical debate. As demographic pressures escalate throughout Europe, the intentional incorporation of migrant workers is increasingly regarded as a competitive need rather than merely a policy alternative. Empirical research indicates that the advantages of diversity significantly differ across industries, company sizes, and institutional contexts (Garnero et al., 2014; Ozgen et al., 2014), rendering cross-country and cross-industry analysis both topical and pertinent to policy-making.

This research analyses the impact of migration-induced workforce diversity on labour productivity in Bulgaria, Finland, and Slovakia, three EU member states with differing migration patterns. Finland has a developed, innovation-driven immigration system, with 85% of large enterprises considering immigration vital for GDP expansion (Dailyfinland, 2025). Bulgaria is developing its integration infrastructure amid political instability, from Schengen entry in January 2025 (OECD, 2025a). Since 2015, Slovakia has experienced a fivefold surge in foreign workers, prompted by significant labour shortages in manufacturing and logistics, while also facing challenges in attracting highly trained migrants (Slovak Spectator, 2026). This article analyses diverse scenarios to provide cross-industry data for underexplored EU economies and offers specific consequences for businesses and policymakers. The document is organised as follows: Section 2 examines the literature, Section 3 delineates the technique, Section 4 presents the results, Section 5 analyses the findings, and Section 6 provides the conclusion.

2. Literature Review

Multiple complementary perspectives provide the theoretical basis for associating worker diversity with corporate financial performance. The resource-based view asserts that a diverse human capital base represents a distinctive and unreplicable competitive advantage (Barney, 1991), whereas information/decision-making theory contends that different backgrounds foster enhanced problem-solving and innovation. Human capital theory underscores the economic significance of migrants' unique skills and implicit knowledge (Becker, 1975), while institutional theory asserts that results are primarily influenced by organisational practices and external regulatory structures (DiMaggio and Powell, 1983). Contrasting viewpoints, such as social identity theory, caution that diversity could elevate interpersonal conflict and coordination costs, negating cognitive advantages (Tajfel and Turner, 2004), particularly in environments where team cohesion is critical for success. The net effect is not predetermined but dependent on context.

Three primary mechanisms empirically connect diversity to financial performance. Firstly, innovation: immigrant inventors accounted for 60% of Finnish patents in 2021 (OECD, 2025b), demonstrating how geographic origin and educational diversity foster knowledge generation in high-tech industries. Secondly, market adaptation: allocating migrants to customer-facing positions has demonstrated an enhancement in business profitability, especially when bolstered by extensive equality policies (Ortlieb et al., 2014). Third, productivity: educational diversity generally improves output and earnings, although age diversity often has adverse impacts; gender diversity advantages knowledge-intensive businesses but may impede performance in conventional sectors (Garnero et al., 2014). This suggests that while diversity can enhance productivity in certain contexts, it may also require careful management to mitigate potential drawbacks in traditional industries. Diversity at birth has been positively associated with firm sales, with smaller firms demonstrating greater proficiency in capitalising on these advantages (Misuraca et al., 2021).

Notwithstanding increasing evidence, substantial research deficiencies persist. Many studies concentrate on individual Western European nations or certain industries, thereby restricting cross-national and cross-industry generalisability. Research pertaining to the context of Bulgaria, Finland, and Slovakia at the firm level is predominantly lacking. Moreover, little research concurrently

investigates many characteristics of diversity within a cohesive framework relevant to EU member states at different levels of institutional maturity. This research tackles these gaps by synthesising theoretical ideas with secondary empirical data from three nations, improving our knowledge of when and how diversity leads to greater productivity outcomes.

3. Methodology

3.1. Research design and data sources

The research was conducted using a quantitative comparative approach, analysing secondary data from Eurostat for Bulgaria (BG), Finland (FI) and Slovakia (SK) for the period 2015-2023. The sample size was n=9 per country and N=27 overall. The four statistics used are the share of foreign workers in total employment; real labour productivity per employed person (2015=10); real growth rate of GDP; and the employment rate of foreign-born persons aged 20–64. Table 1: Comparative analysis of the three countries.

Table 1: Migration and labour market profiles — Bulgaria, Finland, Slovakia (2023)

Characteristic	Bulgaria (BG)	Finland (FI)	Slovakia (SK)
Foreign workers (% of employment)	approx. 1.5%	approx. 6.8%	approx. 0.5%
Productivity index (2015=100)	169.4	115.7	143.8
Real GDP growth 2023 (%)	1.7	−1.3	2.1
Empl. rate foreign-born (%)	70.7	74.0	72.0
Primary migrant source regions	Russia, Turkiye, Germany	Ukraine, Philippines, India	Ukraine, Serbia, India
Migration policy maturity	Emerging	Mature	Developing

Source: own elaboration base on Eurostat (2026)

3.2. Analytical methods and statistical models

Four analytical approaches were applied consecutively, each addressing a specific research concept. All analyses were performed using Microsoft Excel (Data Analysis ToolPak) at $\alpha = 0.05$.

3.3. Pearson correlation (H1)

The Pearson correlation coefficient was employed to evaluate the linear relationship between the share of foreign workers and the labour productivity index for each country individually.

$$r = \frac{\sum(x_i - \bar{x}) \cdot (y_i - \bar{y})}{\sqrt{\sum(x_i - \bar{x})^2 \cdot \sum(y_i - \bar{y})^2}} \quad (1)$$

where x_i denotes the foreign worker share in year i,
y_i represents the productivity index in year i,
$\bar{x}$ and $\bar{y}$ signify the corresponding sample means, and
n = 9 observations per nation.

The coefficient r varies between −1 and +1. Interpretation adheres to Cohen (2013): |r| < 0.20 negligible; 0.20–0.39 weak; 0.40–0.69 moderate; 0.70–0.89 strong; ≥ 0.90 very strong. Two-tailed significance tested with degrees of freedom df = n − 2 = 7.

3.4. One-Way ANOVA (H2)

Differences in mean labour productivity across the three countries were tested with one-way ANOVA:

$$F = \frac{MS^B}{MS^W} \quad (2)$$

where MS^B is mean square between groups as $SS^B/(k-1)$,

MS^W is mean square within groups as $SS^W/(N-k)$,
k is number of groups (= 3),
N is total observations (= 27).

Effect size was reported as eta-squared ($\eta^2 = \mathrm{SS^B/SS^{Total}}$, with η^2 > 0.06 indicating a large effect (Cohen, 2013). $F(2, 24) = 3.40$ at $\alpha = 0.05$.

3.5. Pairwise Welch t-Tests with Bonferroni correction

Following a significant ANOVA result, pairwise Welch t-tests (unequal variances assumed) identified which specific country pairs drive the overall difference:

$$t = \frac{\bar{y}_1 - \bar{y}_2}{\sqrt{\frac{{s_1}^2}{n_1} + \frac{{s_2}^2}{n_2}}} \quad (3)$$

where $\bar{y}_1, \bar{y}_2$ are the group sample means,
s_1, s_2 are the group sample variances,
n_1, n_2 are the group sizes (= 9 each).

With three pairwise comparisons (BG vs. FI; BG vs. SK; FI vs. SK), Bonferroni correction was applied: ${\alpha_a}^{d_j} = 0.05/3 = 0.0167$. Practical significance was assessed using Cohen's $d = |\bar{y}_1 - \bar{y}_2|/ s_p$, where s_p is the pooled standard deviation (d < 0.50 small; 0.50–0.79 medium; ≥ 0.80 large).

3.6. Sign scheme analysis (H3)

To assess year-on-year co-movement between foreign worker numbers and productivity, a sign scheme concordance analysis was applied. A year was classified as concordant if annual changes in both variables shared the same sign:

$$C_t = 1 \; if \; \Delta D_t \cdot \Delta P_t > 0, else \; C_t = 0 \quad (4)$$

where ΔD_t is the year-on-year change in foreign worker count;
ΔP_t is the year-on-year change in productivity index;
C_t is the concordance indicator for year t.

The concordance rate $\mathrm{CR} = \frac{\sum C_t}{T}$, where T = 8 year-pairs (2016–2023). A CR of 0.50 corresponds to the chance-level expectation under no systematic relationship. Statistical significance was assessed via the binomial distribution $P(X \geq x | n = 8, p = 0.5)$.

4. Results

4.1. Descriptive statistics

The descriptive statistics for the labour productivity index and the foreign worker variable for the three countries from 2015 to 2023 are reported in Table 2. The descriptive comparisons reveal variability, which necessitates inferential studies. Table 2 presents the descriptive statistics for the labour productivity index and the foreign worker variables for the three countries between 2015 and 2023.

The rate of increase in labour productivity varied considerably from country to country. Bulgaria was characterised by the widest spectrum (100.0-169.4) and the highest mean productivity index (128.1, SD = 22.7, CV = 17.7%) with a rapid catch-up development from a low base in 2015. The marked annual fluctuations indicated by the high coefficient of variation suggest an economy in a state of structural turmoil with varied annual growth. Finland showed the most stable trend ($\bar{x}$ = 102.6, SD = 6.4, CV = 6.2%, range 95.8–115.7), suggesting a mature economy with small but highly predictable productivity increases. The standard deviation of Finland is close to zero relative to the mean, which

suggests that there are no structural disruptions characteristic to the CEE convergence process. Slovakia had moderate growth from a similar base in 2015 with intermediate variability, a mean of 118.0, a standard deviation of 14.2, and a coefficient of variation of 12.1%.

The variance of the foreign worker variable between countries was far greater. The average number of foreign workers in Finland reached its highest level at 39,090 persons (CV = 36.3%), which was a notable increase during the 2022–2023 period due to the return of post-pandemic migration and the improved recruitment efforts of the Talent Boost Programme. Bulgaria showed a similar mean (34,867 individuals, CV = 31.2%) but a strikingly different compositional profile, with labour migrants filling direct sectoral vacancies. Among the three countries, Slovakia demonstrated the least variation, with a relatively stable, employer-led recruitment paradigm centred on the automotive and logistics sectors. In absolute terms, the number of foreign workers in Slovakia was much lower ($\bar{x}$=6,670, CV=11.6%). The share of foreign-born was rather similar across the countries (BG: 67.8%; FI: 71.7%; SK: 67.8%). Finland had the highest rate in all years, reflecting a more extensive institutional infrastructure for labour market integration, possibly including measures such as language training, recognition of foreign qualifications and support services for new arrivals.

Table 2: Descriptive statistics; Labour productivity index (2015=100), 2015–2023

Country	Mean	Std. Dev.	Min	Max
Bulgaria (BG)	128.1	22.7	100.0	169.4
Finland (FI)	102.6	6.4	95.8	115.7
Slovakia (SK)	118.0	14.2	100.0	143.8

Source: own elaboration based on Eurostat (2024)

4.2. Correlation analysis (H1)

Table 3 displays the Pearson correlation coefficients between the labour productivity index and the share of foreign workers, which were calculated separately for each country using formula (1). These findings demonstrate a significant disparity among the three nations and explicitly challenge H1.

For Bulgaria, the correlation was above Cohen's (2013) "very strong" threshold of 0.90, with a strong positive correlation ($r = 0.950$, $p < 0.01$). This suggests that the productivity index was constantly high during the period 2015-2023 when Bulgaria had a higher share of foreign workers. The strength of the correlation, one of the strongest bivariate relationships theoretically possible with $n = 9$, suggests that the foreign worker variable is not only related to productivity but also reflects a common underlying trend. The trend is likely to be a result of the interaction of economic growth drawing in migrants and migrants' contribution to growth.

The association in Finland ($r = 0.936$, $p < 0.01$) suggests that the tendency is not limited to the Bulgarian context. The correlation found in Finland points to a qualitatively different mechanism: simultaneous productivity growth in the knowledge-intensive sectors and gradual increase in high-skilled immigration through the Talent Boost Programme are driven by innovation and patent activity rather than direct labour market gap-filling. The economic complexity of Finland, where several factors simultaneously influence productivity development, corresponds to the slightly lower r value (0.936 as opposed to 0.950) than that of Bulgaria. Thus, the bivariate signal is attenuated somewhat.

Slovakia had a strong negative association ($r = -0.809$, $p < 0.01$) between the percentage of immigrant workers and the productivity index, which implies that years with a higher share of immigrant workers were associated with lower productivity index values. This result is in direct opposition to H1 for Slovakia and requires detailed discussion as shown in Section 5.2. The negative link reflects the trend of declining foreign worker numbers since 2016, while productivity development continues. This pattern runs counter to the diversity-complementarity mechanism underlying positive correlations in BG and FI.

Table 3: Pearson correlation; Foreign workers share vs. Labour productivity index

Country	r	Interpretation	H1 supported?
Bulgaria (BG)	0.950**	Very strong positive	Yes
Finland (FI)	0.936**	Very strong positive	Yes
Slovakia (SK)	−0.809**	Strong negative	No
Note: ** $p < 0.01$ (two-tailed, df = 7, t = 2.365)			

Source: own elaboration

4.3. One-Way ANOVA (H2)

To test H2 – that is, the existence of statistically significant differences in the growth of labour productivity between the three countries – a one-way ANOVA. The full ANOVA summary table is given in Table 4.

The F values (2, 24) are 5.85 and p = 0.009, indicating that the between-group sum of squares (SS = 2,958.70) is significantly larger than the within-group sum of squares (SS^W = 6,067.76). Since F = 5.85 > F (2, 24) = 3.40 and $p < \alpha = 0.05$, we reject the null hypothesis of equal mean productivity in the three countries. H_2 is supported.

The effect size η^2=0.328 is calculated by Formula (5), and it means the nation affiliation accounts for about 32.8% of the total variation in the productivity index. This is a large effect ($\eta^2 > 0.06$) by Cohen's (2013) standards, suggesting that the cross-country differences are substantively and statistically significant. Knowing the country of origin reduces the uncertainty in the production value of an observation by about one third relative to the grand mean.

Table 4: One-Way ANOVA results; Labour productivity index by country

Source of Variation	SS	df	MS	F	p-value
Between Groups	2,958.70	2	1,479.35	5.851	0.009**
Within Groups	6,067.76	24	252.82		
Total	9,026.46	26			
Note: ** $p < 0.01$; $F(2, 24) = 3.40$; $\eta^2 = 0.328$ (large effect)					

Source: own elaboration

4.4. Pairwise Welch t-Tests

Pairwise Welch t-tests were administered for all three country pairs with a Bonferroni-corrected significance threshold of $\alpha_a{}^{dj} = 0.0167$, following the significant ANOVA result. Table 5 illustrates the findings.

The comparison of Finland with Bulgaria was significant at T(9) = 3.241, p = 0.010, which was below the Bonferroni-adjusted threshold of 0.0167. The positive t-statistic indicates that the mean productivity index of Bulgaria (128.1) is significantly greater than that of Finland (102.6) during the period under review. Cohen's d = 1.46, a large practical effect. Quite considerably. The result reflects the catch-up dynamics discussed in Section 3.1: The index of Bulgaria is rising at a faster pace mainly because of the low base in 2015, not on account of the increased absolute production.

The comparison between Bulgaria and Slovakia was not significant, t(13) = 1.137, p = 0.276; the Bonferroni threshold was not exceeded. Hence, the criterion of statistical significance was not met. Bulgaria's average (128.1) is higher than Slovakia's (118.0). However, the high within-group variance for both countries (BG: s^2 = 515.3; SK: s^2 = 202.8) makes this difference statistically non-significant at n = 9. With this sample size, Cohen's d = 0.56 (medium effect) indicates that the difference is statistically non-significant but practically meaningful. The BG–SK contrast does not support H2.

The comparison between Finland and Slovakia was t(11) = −2.946, p = 0.013, which was lower than the Bonferroni threshold. That the t-statistic is negative means that Slovakia's mean index (118.0) is significantly larger than Finland's (102.6). This is not about absolute production dominance but rather about catch-up dynamics, indicating that Slovakia is improving at a faster rate than Finland in terms of the index being measured. Cohen's d = 1.24 is a meaningful practical effect. H2 confirms the contrast between FI and SK. The paired results together confirm that the deviation of

Finland from the Central and Eastern European countries, with statistically similar index-based development paths, is the main component behind the substantial ANOVA effect.

Table 5: Pairwise Welch t-Test results (Bonferroni-corrected α = 0.0167)

Country Pair	df	t Stat	p (two-tail)	Significant?	Interpretation
BG vs. FI	9	3.241	0.010*	Yes (p < 0.017)	BG higher index growth
BG vs. SK	13	1.137	0.276	No	Similar catch-up pace
FI vs. SK	11	−2.946	0.013*	Yes (p < 0.017)	SK higher index growth

*Note: * p < 0.0167 (Bonferroni-corrected). Cohen's d computed using pooled SD, formula (9)*

Source: own elaboration

4.5. Sign scheme analysis (H3)

H_3 studied the stability of the diversity–productivity co-movement by testing whether the annual changes in the number of foreign workers and the productivity index moved in the same direction using the year-to-year sign scheme. The concordance ratios are shown in Table 6.

Bulgaria and Finland agreed in six out of eight years (CR = 0.75, or 75%). $P(X \geq 6 \mid n = 8) \approx 0.145$, under the binomial null hypothesis of no systematic association ($p_0 = 0.50$); not statistically significant at $\alpha = 0.05$ for the country and the individual. However, the positive co-movement theory is supported by the repeated persistence of the 6/8 pattern in different countries with different institutional settings. The trend for Finland is particularly interesting. Five years of concordance (2019-2023) suggest that the diversity-productivity relationship found a positive dynamic that remained stable after the Talent Boost Programme reached operational maturity. H3 has some support in Finland and Bulgaria.

A concordance rate occurred in only 3 out of 8 years (CR = 0.375 or 37.5%) in Slovakia, below the chance-level expectation of 4/8. The probability of obtaining three or fewer concordant years under H_0 is $P(X \leq 3 \mid n = 8, p = 0.5) \approx 0.363$, which is not statistically significant. But it is clear that the directional difference between Slovakia (3/8) and Finland/Bulgaria (6/8 each) is of considerable importance. In Slovakia, history is characterised by years of increasing productivity with a decrease in foreign workers, which suggests a structural characteristic of capital-deepening rather than growth from variety. H3 does not apply to Slovakia. The international variation in concordance rates provides the clearest descriptive evidence for the role of institutional context in the diversity–productivity relationship.

Table 6: Sign scheme concordance results (2016–2023)

Country	Concordant Years	Concordance Rate	H3 supported?
Bulgaria (BG)	6 / 8	75%	Partially
Finland (FI)	6 / 8	75%	Partially
Slovakia (SK)	3 / 8	37.5%	Not supported

Note: CR = concordance rate. $P(X \geq 6 | n = 8, p = 0.5) \approx 0.145$.

Source: own elaboration

5. Discussion

5.1. Interpretation of correlation results for Bulgaria and Finland

The Pearson correlations were strongly positive for Finland ($r = 0.936$, $p < 0.01$) and Bulgaria ($r = 0.950$, $p < 0.01$), supporting the resource-based view and human capital theory. Becker (1975) asserts that individuals and collectives realise the productive returns of workers' accumulated skills and knowledge. Aggregate production per worker rises if migrants offer complementary, instead of substitutable, human capital. Peri (2012) empirically shows that an increase of one percentage point in the immigrant employment share increases the total factor productivity by 0.4-0.5% through job specialisation. Indigenous workers transition to communication-based roles, and immigrants take over manual labour jobs. In 14 OECD countries, Ortega and Peri (2014) found a

positive correlation between immigration and GDP, which persisted after controlling for human capital levels and trade openness.

In Finland the connection is still more strongly reinforced by an additional innovation channel. Ozgen et al. (2014) demonstrate that cultural diversity increases the likelihood of product innovation, particularly in R&D-intensive industries that constitute the backbone of Finland's ICT and engineering export economy. This is also confirmed by the OECD (2025b). In 2021, Finnish immigrant innovators accounted for 60% of national patents issued. Using French firm-level data, Mitaritonna et al. (2017) show that immigration increases total factor productivity through better skill-task matching. There are two caveats for both countries; Lewis (2011) showed that the prevalence of immigrant labour may reduce the incentive to adopt labor-saving technologies and therefore impede long-term productivity. Further, the pandemic year 2020 was a year of higher mechanical productivity as lower-productivity workers were disproportionately displaced (Bils, 1985; Caballero and Hammour, 1994), temporarily breaking the link between migrant flows and productivity dynamics. Thus, correlations must be interpreted as reflecting a positive macro-level co-movement and not precise causal estimations.

5.2. Slovakia's negative correlation: A structural and sectoral explanation

The most mathematically complicated result of this study is the negative correlation ($r = -0.809$, $p < 0.01$) in Slovakia. This finding is consistent with the firm-level analysis of Garnero et al. (2014), who show that the relevance of the diversity-productivity link depends on the position of diversity in the skill distribution. High-skill jobs benefit from diversity in terms of creativity. In low-skill routine jobs, diversity increases coordination costs without triggering cognitive productivity processes. The migrant labour force in Slovakia is mostly employed in low-skill jobs, and the share of foreign workers in high-skill positions has fallen by almost half over the last decade. In 2023, the EU Blue Card was held by only 24 persons, compared to almost 7 400 in Poland (OECD, 2025c). After Slovakia's "somewhat unfavourable" MIPEX rating, Alesina et al. (2016) and Niebuhr (2010) both assert that the link between diversity and innovation is hampered or blocked by poor institutional integration frameworks.

During this period, the main driver of productivity in Slovakia was capital deepening rather than worker diversity. Volkswagen, Kia, Stellantis and Jaguar Land Rover have all increased productivity through various levels of capital investment, with the automotive sector making up more than 43% of Slovak industrial output. This trend was accurately predicted by Acemoglu and Restrepo (2018), who argued that automation raises output per worker while also reducing demand for semi-skilled assembly positions, which are often filled by immigrant labourers. This means that the number of migrants is inversely proportional to production. The right inference from policy is not to restrict immigration but to change its composition. This implies a transition from the volume-driven and low-skill migration model to a quality-driven and skill-specific one, which could activate the knowledge-recombination pathways found in Finland and Bulgaria.

5.3. ANOVA, effect size, and the meaning of country-level heterogeneity

The one-way ANOVA ($F(2, 24) = 5.85$, $p = 0.009$, $\eta^2 = 0.328$) confirms that the nation context accounts for approximately one third of the total variance in productivity growth trajectories, which is a substantial effect according to the criteria of Cohen (2013). Alesina et al. (2016) identify a set of characteristics that together affect the degree to which diversity translates into developmental outcomes: economic structure, institutional quality, sophistication of the migration policy, and sectoral composition. National membership is a composite measure of these elements. The pairwise t-tests show that the main factor for the large overall effect is the difference of Finland from both CEE economies (BG: $p = 0.010$; SK: $p = 0.013$). Catch-up convergence shows statistically similar trends in Bulgaria and Slovakia ($p = 0.276$). This finding is in line with the convergence dynamics proposed by Prochniak (2011). Transition economies experience faster index growth from

lower levels as they reduce the efficiency gap with Western European frontiers, not because of higher absolute productivity. The methodology of the index hides the much larger absolute production of Finland based on PPS. When using these results for policy purposes, this limitation of the methodology must be explicitly acknowledged. The structural volatility of catch-up growth is reflected by the much higher within-group variance of BG (s^2 = 515.3) and SK (s^2 = 202.8) than FI (s^2 = 40.3) (Rodrik, 2008). This evidence supports the use of Welch t-tests rather than the more traditional Student's t-tests.

5.4. Sign scheme, year-on-year dynamics, and institutional maturity

The sign scheme is consistent with the directional pattern: Bulgaria and Finland had 6 of 8 years in the same direction (75%), while Slovakia had only 3 of 8 (37.5%), compared with a chance-level benchmark of 4 of 8. The concordance in Finland is very unique. The Talent Boost Programme was integrated for five consecutive concordant years from 2019 to 2023 in accordance with Ortlieb et al. (2014) statement that comprehensive integration frameworks stabilise, rather than initiate, the diversity-productivity link. The two anomalous years for Finland (2016, 2018) can be explained by the death of Nokia's mobile business and the restructuring of the paper industry. These macroeconomic shocks lie outside of migratory dynamics. The same concordance rate of Bulgaria (6/8) implies a unique mechanism: direct labour market complementarity. This is consistent with Cattaneo et al. (2015), who find that the productivity effects of immigration are larger in labor-scarce economies when migrants fill structural gaps. Bulgaria's two incongruous years (2016, 2020) are explained by the normalisation of post-accession flows and the mechanical productivity impact of the pandemic. The capital-deepening interpretation is further strengthened by Slovakia's persistently discordant trend of rising productivity and falling foreign workers in four of the five non-concordant years. 2023 has been a uniquely concordant year and may be indicative of the first effects of the 2024 Blue Card changes.

5.5. Theoretical contributions and boundary conditions

This study makes three contributions to the literature on diversity-productivity. First, it shows that diversity processes in firms can be identified at the national level, thereby extending the resource-based view and human capital theory to a macro-comparative perspective. Second, it offers macro-level support to the contingency perspective put forward by Van Knippenberg and Schippers (2007) that diversity is advantageous only if contextual factors, especially the advancement of integration policies and the skill composition of migrants, facilitate the development of diverse informational resources, as discussed in Hunt and Gauthier-Loiselle (2010). The moderating roles of task characteristics and group processes at the organisational level are similar to those at the national level, such as integration policies and sectoral mixes. Third, the study provides context-specific findings from Central and Eastern Europe (CEE), a region that has been under-researched in the diversity management literature (Elgar, 2010). This shows how much institutional and sectoral differences can produce very different results, even in a largely comparable regional cohort.

The Slovak case sets an important boundary condition for the diversity bonus in Page et al. (2019), the premium is for cognitive diversity at the skill frontier, not demographic diversity in routine production jobs. This is consistent with the findings of Hoogendoorn et al. (2013), who, in an experimental field study, found that team diversity improved performance only for complex, non-routine tasks. A valid counterargument is Bulgaria's equal concordance rate (6/8) despite its poor institutions, which refutes the institutional maturity theory. Bulgaria's mechanism, however, is based on labour market complementarity rather than institutionally mediated knowledge spillovers. Cattaneo et al. (2015) show that this qualitatively unique method is feasible in economies with labor shortages, even without a developed integration infrastructure. One solution would be, for example, to apply the results of the study by Han et al. (2020) from the study Creating Mutual

Benefits to Leverage a Racially Diverse Workforce: The Impact of Firm-Level Racial Diversity on Financial and Labor Performance under Broad Stock Option Plans. In contrast, the Finnish system requires institutional support, but through cognitive diversity and innovation it delivers more scalable and sustainable productivity improvements.

6. Conclusions

6.1. Summary of key findings

This article investigated the association between migration-related workforce diversity and labour productivity in Bulgaria, Finland and Slovakia for the period 2015-2023 using Pearson correlation, one-way ANOVA, pairwise Welch t-tests, and sign scheme concordance analysis, based on secondary data from Eurostat. Hypothesis H1 was verified for Bulgaria ($r = 0.950$) and Finland ($r = 0.936$) but was refuted for Slovakia ($r = -0.809$). This suggests that the diversity-productivity relationship is not universal but depends on the composition of migrant skills, sector framework and institutional environment. ANOVA confirmed Hypothesis 2 ($F(2, 24) = 5.85$, $p = 0.009$, $\eta^2 = 0.328$), and the pairwise t-tests indicated that the catch-up effect explains the reduced index growth in Finland compared to the Central and Eastern European countries, while Bulgaria and Slovakia show similar convergence trends ($p = 0.276$). H3 received mixed support. Finland and Bulgaria showed 75% agreement to the sign scheme (6 out of 8 years), while Slovakia showed only 37.5% (3 out of 8). Finland's five concordant years (2019-2023) indicate that institutional maturity stabilises the correlation between diversity and production over time.

6.2. Theoretical and practical implications

The research provides a theoretical justification for the institutional context as a key moderator of the diversity–productivity relationship (DiMaggio and Powell, 1983; Ortlieb et al., 2014); extends the Resource-Based View and Human Capital Theory to a macro-comparative setting; and provides context-specific evidence from Central and Eastern Europe that questions the notion of regional groupings as analytically homogeneous (Elgar, 2010).

Finland is pursuing consolidation by tackling the 15% wage gap between locals and foreigners, enhancing English-language professional environments to eliminate language barriers in ICT and engineering, and investing in family integration support to stem the loss of highly skilled migrants (OECD, 2025b). Bulgaria's accession to the Schengen Area in January 2025 provides a structural opportunity to move from volume-driven to quality-driven migration by implementing accelerated EU Blue Card pathways, establishing bilateral qualification recognition agreements with key source countries, and developing a robust labour market integration infrastructure (OECD, 2025a). The results provide a clear policy warning for Slovakia: an expansion of the quantitative migrant workforce without accompanying skill development does not leverage the benefits of diversity. Key actions include fast-tracking the 2024 Blue Card changes, introducing regional variations in immigration policy to address the dire shortages in Eastern Slovakia, and creating a dedicated talent acquisition agency modelled on Finland's Talent Boost Program (OECD, 2025c).

6.3. Limitations and future research

Various limitations preclude conclusions. The aggregation of data at the country level does not allow for causal inference at the firm level, and reverse causality cannot be ruled out in the absence of identification through instrumental variables (e.g., productive economies attract migrants, and automation reduces demand for migrants) (Misuraca et al., 2021). The productivity index (2015=100) measures rates of growth, not absolute levels, which creates a catch-up bias that distorts the true absolute productivity hierarchy. The statistical power is constrained by the sample of nine annual observations per country. Furthermore, a unidimensional proxy of workforce diversity (total foreign worker count) is used, which confuses theoretically different dimensions – birthplace,

education, age and gender – which are expected to have distinct effects (Garnero et al., 2014). The analysis is subject to omitted variable bias due to the lack of controls for GDP cycles, EU structural budget allocations and sectoral capital investment.

Future research should focus on firm-level panel data analyses using matched employer–employee administrative data for BG, FI, and SK, following the approaches of Garnero et al. (2014) and Ortlieb et al. (2014) to obtain causal estimates and identify firm size and industry heterogeneity. A sectoral analysis of Eurostat's nama_10_lp_a21 dataset and Labour Force Survey occupational data would examine whether Slovakia's aggregate negative correlation masks positive effects in its growing IT services sector. Difference-in-difference studies with similar EU member states as controls would provide quasi-experimental evidence on the causal effects of changes in integration policy. Longitudinal studies to assess the effects of Slovakia's 2024 Blue Card reforms and after Bulgaria's Schengen accession by 2026–2028 would be useful. Expanding the scope to include Poland, Czechia, Hungary and Romania will, in the end, produce a more complete CEE panel with enough statistical power to critically assess the institutional maturity moderation hypothesis.

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Data Availability Statement

The data is publicly available on Eurostat: https://ec.europa.eu/eurostat/databrowser/. Codes: migr_imm1ctz; nama_10_lp_ulc; nasq_10_nf_tr; lfsa_ergan.

Conflicts of Interest

The authors declare no conflict of interest.

Declaration of Generative AI

During the preparation of this work, the authors used AI-assisted tools for language editing and structural support. After using these tools, the authors reviewed and edited the content as needed and took full responsibility for the published article.

References

Acemoglu, D., & Restrepo, P. (2018). The race between man and machine: Implications of technology for growth, factor shares, and employment. *American economic review*, *108*(6), 1488-1542. https://doi.org/10.1257/aer.20160696

Alesina, A., Harnoss, J., & Rapoport, H. (2016). Birthplace diversity and economic prosperity. *Journal of economic growth*, *21*(2), 101-138. https://doi.org/10.1007/s10887-016-9127-6

Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of management*, *17*(1), 99-120. https://doi.org/10.1177/014920639101700108

Becker, G. S. (1975). Investment in human capital: effects on earnings. In *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education, Second Edition* (pp. 13-44). NBER.

Bils, M. J. (1985). Real wages over the business cycle: evidence from panel data. *Journal of Political economy*, *93*(4), 666-689. https://doi.org/10.1086/261325

Caballero, R. J., & Hammour, M. L. (1994). The cleansing effect of recessions. *American Economic Review*, *84*(5), 1350–1368.

Cattaneo, C., Fiorio, C. V., & Peri, G. (2015). What happens to the careers of European workers when immigrants "take their jobs"?. *Journal of Human Resources*, *50*(3), 655-693. https://doi.org/10.3368/jhr.50.3.655

Cohen, J. (2013). *Statistical power analysis for the behavioral sciences*. routledge. Lawrence Erlbaum Associates.

Dailyfinland. (2025). 85% large Finnish firms see immigration as prerequisite for GDP growth. https://www.dailyfinland.fi/business/48225

DiMaggio, P. J., & Powell, W. W. (1983). The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields. *American sociological review*, *48*(2), 147-160. https://doi.org/10.2307/2095101

Elgar, E. (2010). *International Handbook on Diversity Management at Work*.

Eurostat. (2024). *Eurostat database*. European Commission. Retrieved October 30, 2025, from https://ec.europa.eu/eurostat/data/database

Garnero, A., Kampelmann, S., & Rycx, F. (2014). The heterogeneous effects of workforce diversity on productivity, wages, and profits. *Industrial Relations: A Journal of Economy and Society*, *53*(3), 430-477. https://doi.org/10.1111/irel.12064

Han, J. H., Shin, D., Castellano, W. G., Konrad, A. M., Kruse, D. L., & Blasi, J. R. (2020). Creating mutual gains to leverage a racially diverse workforce: The effects of firm-level racial diversity on financial **a**nd workforce outcomes under the use of broad-based stock options. *Organization Science*, *31*(6), 1515-1537. https://doi.org/10.1287/orsc.2020.1360hoo

Hoogendoorn, S., Oosterbeek, H., & Van Praag, M. (2013). The impact of gender diversity on the performance of business teams: Evidence from a field experiment. *Management science*, *59*(7), 1514-1528. https://doi.org/10.1287/mnsc.1120.1674

Hunt, J., & Gauthier-Loiselle, M. (2010). How much does immigration boost innovation?. *American Economic Journal: Macroeconomics*, *2*(2), 31-56. https://doi.org/10.1257/mac.2.2.31

Lewis, E. (2011). Immigration, skill mix, and capital skill complementarity. *The Quarterly Journal of Economics*, *126*(2), 1029-1069. https://doi.org/10.1093/qje/qjr011

Misuraca, R., Annosi, M. C., Carillo, M. R., & Dolfsma, W. (2021). The Effect of Workforce Birthplace Diversity on Firms: When do Migrants increase Firms' Performance?. https://doi.org/10.21203/rs.3.rs-337575/v1

Mitaritonna, C., Orefice, G., & Peri, G. (2017). Immigrants and firms' outcomes: Evidence from France. *European Economic Review*, *96*, 62-82. https://doi.org/10.1016/j.euroecorev.2017.05.001

Niebuhr, A. (2010). Migration and innovation: Does cultural diversity matter for regional R&D activity?. *Papers in Regional Science*, *89*(3), 563-586. https://doi.org/10.1111/j.1435-5957.2009.00271.x

OECD. (2025a). *International Migration Outlook 2025: Bulgaria*. OECD Publishing. https://doi.org/10.1787/ae26c893-en

OECD. (2025b). *OECD Economic Surveys: Finland 2025 – Enriching human capital with more foreign talent*. OECD Publishing. https://doi.org/10.1787/985d0555-en

OECD. (2025c). *International Migration Outlook 2025: Slovak Republic*. OECD Publishing. https://doi.org/10.1787/ae26c893-en

Ortega, F., & Peri, G. (2014). Openness and income: The roles of trade and migration. *Journal of international Economics*, *92*(2), 231-251. https://doi.org/10.1016/j.jinteco.2013.11.008

Ortlieb, R., Sieben, B., & Sichtmann, C. (2014). Assigning migrants to customer contact jobs: A context-specific exploration of the business case for diversity. *Review of Managerial Science*, *8*(2), 249-273. https://doi.org/10.1007/s11846-013-0106-4

Ozgen, C., Peters, C., Niebuhr, A., Nijkamp, P., & Poot, J. (2014). Does cultural diversity of migrant employees affect innovation?. *International Migration Review*, *48*, S377-S416. https://doi.org/10.1111/imre.12138

Page, S., Cantor, N., & Lewis, E. (2019). *The diversity bonus: How great teams pay off in the knowledge economy*.

Peri, G. (2012). The effect of immigration on productivity: Evidence from US states. *Review of Economics and Statistics*, *94*(1), 348-358. https://doi.org/10.1162/REST_a_00137

Prochniak, M. (2011). Determinants of economic growth in Central and Eastern Europe: the global crisis perspective. *Post-communist economies*, *23*(4), 449-468. https://doi.org/10.1080/14631377.2011.622566

Rodrik, D. (2008). *One economics, many recipes: globalization, institutions, and economic growth*. Princeton University Press.

Slovak Spectator. (2026). Foreign workers become a pillar of Slovakia's labour market. https://spectator.sme.sk/business/c/foreign-workers-become-a-pillar-of-slovakia-s-labour-market

Tajfel, H., & Turner, J. C. (2004). The social identity theory of intergroup behavior. In *Political psychology* (pp. 276-293). Psychology Press.

Van Knippenberg, D., & Schippers, M. C. (2007). Work group diversity. *Annual Review of Psychology*, *58*(1), 515-541. https://doi.org/10.1146/annurev.psych.58.110405.085546