



Exploring Migration Determinants: a Meta-Analysis of Migration Drivers and Estimates

Akira Soto Nishimura¹ · Mathias Czaika¹

Accepted: 23 September 2023
© The Author(s) 2023

Abstract

This comprehensive study delves into over 100 empirical articles, examining the influence of structural drivers on both internal and international migration. Employing a meta-analysis approach, we dissect these studies to pinpoint the prevalent migration drivers frequently subjected to quantitative scrutiny. Our investigation extends to scrutinizing major migration drivers in terms of their statistical impact, directional tendencies, and statistical significance. Our findings underscore that indicators such as income or GDP, education, migrant networks, gender, age, and family characteristics are the most commonly scrutinized factors shaping migration patterns. Notably, geographical distance, gender, and migrant networks emerge as highly consistent drivers, exhibiting a remarkable uniformity in both effect direction and statistical significance across the most frequently studied factors. Numerous migration drivers exhibit statistical significance roughly around 50% of the time, while several others fall considerably below this threshold. Intriguingly, we delve into the complex variations characterizing the impact of destination country GDP per capita. Our exploration reveals that articles reporting a negative effect for destination country GDP per capita are more likely to focus on irregular or asylum migration flows. However, an intriguing subset of articles that also explore asylum migration flows finds a positive effect. These nuanced disparities are further influenced by variations in sample composition, control variables, statistical models, and the operationalization of GDP per capita. In sum, our in-depth analysis sheds light on the multifaceted landscape of migration drivers, offering critical insights into both the consensus and divergence within migration research.

Keywords Migration drivers · Meta-analysis · International migration · Literature review

✉ Akira Soto Nishimura
akiranex333@gmail.com; akira.soto-nishimura@donau-uni.ac.at

¹ Danube University Krems, Krems an der Donau, Austria

Introduction

The field of migration studies has witnessed a remarkable surge in scholarly output since the turn of the millennium (Pisarevskaya et al., 2020). Recent years have seen concerted efforts to systematically distill insights from this wealth of research, particularly focusing on the fundamental question of why individuals migrate (Czaika & Reinprecht, 2020; Pitoski et al., 2021). Systematic reviews of empirical findings play a pivotal role in crystallizing the landscape of migration research, illuminating both its breadth and the consistency of its findings across diverse studies. This article capitalizes on a newly available dataset (Soto Nishimura, 2022), encompassing essential indicators and findings extracted from more than 100 articles pertaining to international and internal migration.¹ This dataset constitutes an invaluable resource for the study of migration drivers, elucidating how each article operationalizes these drivers and scrutinizes their statistical significance and effect direction.

Migration drivers, the factors that influence migration decisions, hold the power to shape broader population movements by either enabling, facilitating, triggering, constraining, or preventing migration (Van Hear et al., 2018). These drivers not only affect the likelihood of migration as a behavioral choice but also dictate the prominence of specific migration routes and the desirability of particular destinations. However, migration drivers seldom function in isolation; they typically operate in concert with other structural factors, collectively crafting intricate migration driver environments (Czaika & Reinprecht, 2020).

Empirical research into migration drivers often grapples with the challenge of transforming abstract ideas (latent variables) believed to influence migration choices into quantifiable variables that can be measured and analyzed. Researchers, constrained by practical limitations such as data availability, may need to proxy more complex factors. For instance, when investigating the impact of civil conflict on migration, a researcher might resort to a related measure like the number of casualties. Operationalizing migration drivers varies across studies, with choices including different indices for similar concepts and decisions on whether to lag or transform variables to address issues like skewness. The sheer volume of variables available in databases such as the World Development Indicators necessitates careful selection to avoid over-specification, multicollinearity, and other statistical pitfalls. Hence, the migration driver data inventory serves as a record of how researchers have tackled the operationalization of migration drivers.

This article leverages this dataset to explore which migration drivers are most frequently under scrutiny and their statistical robustness. Here, “statistical robustness” refers to how often a migration driver is deemed statistically significant and how consistently its effect direction is observed. Thus, this review seeks to summarize and quantify empirical findings and estimates concerning the core question: “what drives human migration?” This meta-review not only brings into focus research imbalances and biases in the frequency of studying certain migration drivers but

¹ Available on the website of the Horizon 2020 project QuantMig: https://www.quantmig.eu/migration_driver_inventory/

also scrutinizes the robustness of variable estimates in terms of their statistical significance and effect direction. In complement to existing literature reviews on migration drivers (such as Czaika & Reinprecht, 2020; Kuhnt, 2019), this meta-review offers a quantitative synthesis of results. Furthermore, it distinguishes itself from other meta-analyses on migration, such as Pitoski et al. (2021), by categorizing variables across individual, origin country, destination country, and dyadic levels. Additionally, we draw a clear distinction between internal and international migration. Consequently, our analysis provides a more granular examination compared to Pitoski et al. (2021).

This article is structured as follows: “Previous Meta-Analyses on Migration Drivers” section provides an overview of recent meta-analyses in the field of migration. In “Research Frequency of Migration Drivers and Significance of Estimates” section, we introduce the Quantmig Migration Drivers Data Inventory Records. The results section is divided into three parts: “Research Frequency of Migration Drivers” section assesses the frequency of migration driver analysis and the diversity of driver types considered, while “Statistical Significance of Estimates” section evaluates the robustness of migration variables in terms of effect direction and statistical significance. The “Understanding Variations in the Direction of Effect: the Income Variable” section conducts an in-depth analysis of the most frequently studied variable, GDP per capita, to elucidate variations in effect direction. Finally, the “Conclusion” section contextualizes our findings within recent meta-analyses on migration, highlighting infrequently analyzed variables and those lacking statistical robustness, offering insights for future research in migration studies.

Previous Meta-Analyses on Migration Drivers

There have been essentially two types of meta-analyses in the field of migration. There are the articles that take a wide approach and do not focus on a specific type of migration or driver such as Czaika and Reinprecht (2020), Pitoski et al. (2021), and Aslany et al. (2021). Then there are the articles that take a narrow approach and focus on a specific type or driver of migration such as Hoffmann et al. (2020), Beine and Jeusette (2021), and Soon (2013).

Pitoski et al. (2021) embarked on a meta-analysis that delves into the statistical effects of multiple migration drivers. Their exhaustive review of over 100 articles yielded a ranking of migration drivers based on their statistical robustness. The ranking was predicated on the frequency with which a particular migration driver’s effect manifested in a certain direction, coupled with instances where authors explicitly asserted the impact of a factor on migration. Their top five ranked drivers encompassed origin country education level, origin country unemployment rate, origin country population size, destination country migrant communities, and geographical distance. Remarkably, only geographical distance consistently exhibited a dampening effect on migration, setting it apart from the other drivers.

Aslany et al. (2021) conducted a similar analysis to that presented in this article, albeit with a focus on migration aspirations. Their study complements our work by enabling a comparison between the two domains of literature in terms of frequently

analyzed migration drivers. It also offers insights into whether drivers statistically robust in their impact on migration aspirations bear a similar robustness in actual migration outcomes. Their findings highlight age and migration networks as the most consistent drivers in terms of effect direction, followed by gender, marriage/cohabitation, urban residency, socio-economic status, and educational attainment. Violence/insecurity, while consistent in direction, was studied less frequently than the aforementioned drivers.

Czaika and Reinprecht (2020) did not analyze statistical effect and direction but on trends with regards to methodology, migration drivers analyzed, types of data used, locus of the migration driver, and level of analysis (macro, micro, meso). They found that economic and socio-cultural drivers were most frequently studied. The relative popularity of economic drivers and socio-cultural drivers declined from the year 2000 to 2018 while environmental and individual drivers increased in popularity.

Hoffmann et al. (2020) and Beine and Jeusette (2021) centered their investigations on articles examining the influence of environmental conditions on migration. A key consensus arising from both studies is that environmental conditions exert a more pronounced impact on migration in developing countries. Furthermore, they concurred that there was not a discernible systematic difference between articles investigating internal migration as opposed to international migration. The type of natural disaster was found to be a non-determining factor. Interestingly, both studies underscored the importance of employing panel data and addressing measurement errors, as these factors seemed to enhance the evidential weight of the environmental driver's effect on migration.

Soon (2013) took a different avenue by analyzing 22 articles that estimated the influence of education on migration. In his findings, higher levels of education correlated positively with an increased likelihood of migration, at least within the base models. An intriguing trend emerged, revealing that more recent publications were more inclined to establish a positive link between education and migration. Moreover, Soon's analysis unveiled a stronger educational effect when studies focused on skilled migration or employed broad categorizations of education rather than specific years of schooling.

In synthesis, past reviews on migration drivers provide crucial context for our study. They collectively suggest that we should anticipate positive effects on migration from education, origin country unemployment rate, and origin country population size, while geographical distance is likely to exert a negative influence on migration. They also suggest that economic and socio-cultural drivers should be among the most ubiquitous drivers. These insights serve as valuable reference points as we delve into the statistical assessment of migration drivers in this article.

A Meta-Assessment of Migration Drivers: Data and Methodology

This meta-review capitalizes on the comprehensive resource of the Quantmig Migration Drivers Data Inventory Records (QMD). The QMD serves as a repository cataloging the spectrum of variables scrutinized across more than 100 articles,

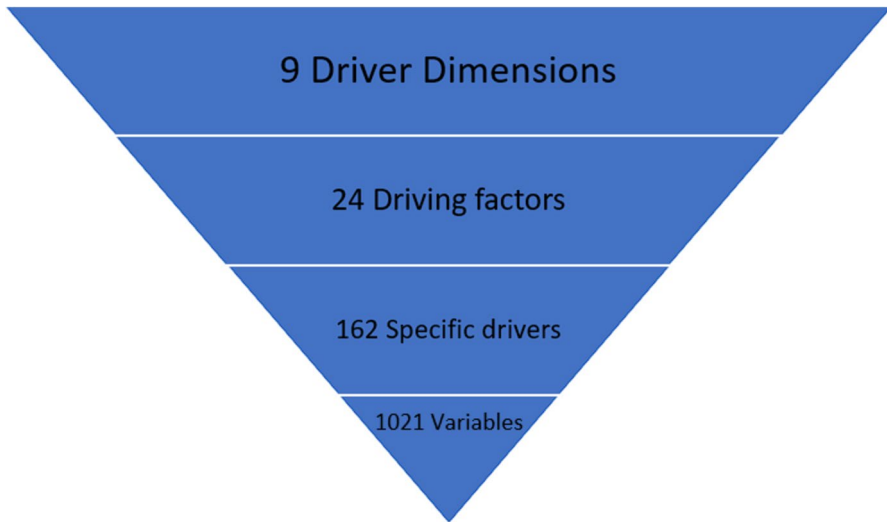


Fig. 1 Conceptualizing and measuring migration drivers at four levels of aggregation

imparting invaluable insights into the field of migration research. This inventory distinguishes variables across four distinct levels of aggregation, as illustrated in Fig. 1, with the most encompassing level positioned at the summit—the Driver dimension.

The overarching design of the QMD is rooted in the schema conceptualized by Czaika and Reinprecht (2020), spanning two foundational dimensions: the driver dimension and driving factor level. The driver dimension is a scaffolding of nine overarching categories, including demographic, economic, environmental, human development, individual resources, politico-institutional, security, socio-cultural, and supranational. Nested within these categories are 24 driving factors, which in turn are meticulously deconstructed into an intricate tapestry of over 150 distinct drivers. Navigating further down, we arrive at the variable level, where the landscape flourishes with over 1000 unique variables. For elucidation, consider the example of variables such as “own land,” “own car,” and “own home.” Each of these variables converges under the specific driver “individual/household material assets,” situated within the driving factor “personal resources & migration experience,” which in turn finds its place within the driver dimension “individual resources.”

While the QMD adopts the migration driver categories as proposed by Czaika and Reinprecht (2020), it is worth noting that alternative typologies exist, and the boundaries demarcating categories are not invariably distinct. The intricacies become evident, for instance, when attempting to differentiate between the driving factors “public infrastructure, services, and supply” and “migration policy and other public policies.” Often, the influence of public policy extends its reach to the realm of public infrastructure, services, and supply, blurring the lines of demarcation. As such, the QMD stands as an invaluable tool, fostering a comprehensive understanding of migration drivers. It is mindful of the dynamic interplay between categories and factors, which underscores the complexity inherent in the field of migration

research. The articles considered for inclusion in this dataset originated from an initial selection conducted by Czaika and Reinprecht (2020). In their assessment, they scrutinized 660 English-language research documents pertaining to migration drivers. Czaika and Reinprecht (2020, p. 7) stipulated that a key selection criterion was the presentation of novel empirical evidence or influence within the field of migration studies, especially if they hailed from respected organizations. These documents were sourced from a variety of outlets, including peer-reviewed journals, books, reports, and working papers. Their identification involved utilizing various search engines, such as Google Scholar and Scopus, literature datasets, cross-referencing documents, and convening an expert workshop (Ibid). From this initial collection, all articles published from the year 2000 onwards were considered for inclusion into the Quantitative Migration Dataset (QMD) (Soto Nishimura & Czaika, 2022). Articles were excluded if they were purely theoretical, lacked substantial large-N quantitative datasets, or relied on small sample sizes, a common characteristic of qualitative articles that rely on interviews and focus groups (Ibid).² In total, the dataset encompasses 176 articles available online between 2000 and 2019.

Crucially, the QMD contains information on the results of articles in terms of statistical significance ($p < .05$) and the direction of effect (positive, indicating increased migration, and negative, indicating decreased migration). Articles often feature multiple models, wherein the significance and effect direction of a variable may differ among them. For each article, we recorded results from only one of the models per variable (Soto Nishimura & Czaika, 2022). This model was typically either the main one, as indicated by the author/s of the article, or the one with the most control variables (Ibid). In cases where a variable did not appear in the main model but did appear in a different model, such as a robustness check model, we derived the result from that specific model. In certain instances, the analysis was stratified by gender, country, or race/ethnicity. In such scenarios, the results from the “male sample” were recorded. When the analysis was stratified by both country and race/ethnicity, we recorded the value from the group whose regression table appeared first. Alternatively, in cases involving multiple split analyses, we relied on the majority value (Ibid). In articles featuring multiple dependent variables, such as internal and international migration or migration intention and migration behavior, we consistently prioritized “international” over “internal” and “behavior” over “intention.”

Our methodology diverges from traditional literature reviews in that we summarize past literature findings using descriptive statistics presented through graphs and tables. The QMD enables us to quantify how frequently variables were analyzed, how often they exhibited statistical significance, and the direction of their effect. Our primary analytical focus centers on migration factors and specific driver levels of aggregation. To prevent overwhelming readers with an excessive volume of results, we concentrate on the most prevalent migration drivers.

² The decision to exclude qualitative articles was rooted in the predominant focus of our analysis on statistical significance and effect direction. Qualitative articles typically lack these two elements, and their inclusion would have primarily contributed to the qualitative examination of migration drivers.

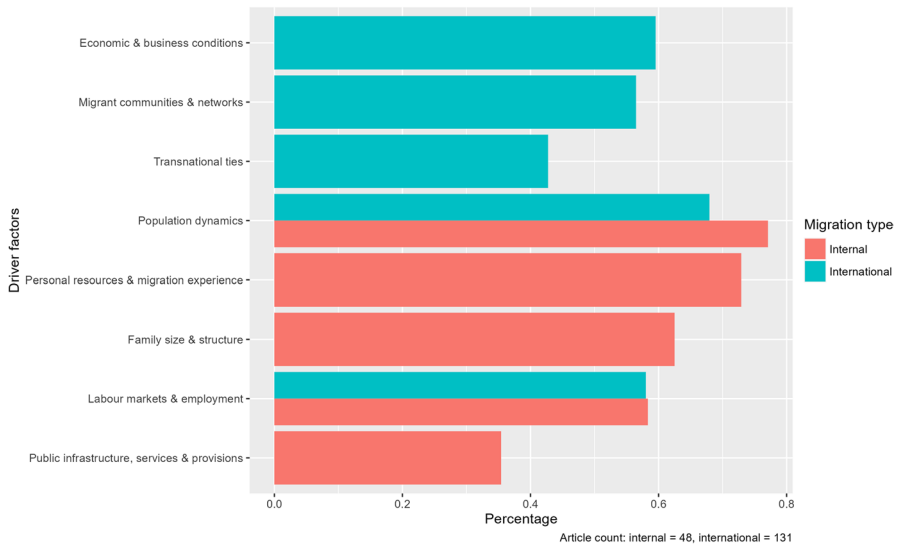


Fig. 2 Frequency analysis of driving factors studied in $N = 176$ articles. Source: own elaboration based on QMD.

It is worth noting that the initial selection of articles was based on specific criteria: they were chosen if they “presented new empirical findings or were influential in the field of migration studies and/or came from respected organizations” (Czaika & Reinprecht, 2020, p. 7). Articles were further selected if they featured quantitative analysis, typically involving regression tables. However, it remains uncertain whether and to what extent this selection process might have introduced biases into the results, affecting both the migration factors examined and their robustness. Additionally, the Quantitative Migration Dataset (QMD) lacked comprehensive information regarding interactions among migration factors or whether variables underwent transformations such as lagging or logarithmic conversion. Including such details would be a valuable enhancement, given that future research on migration drivers should increasingly emphasize the intricate interplay and complex dynamics among these factors (Czaika et al., 2021).

Research Frequency of Migration Drivers and Significance of Estimates

This meta-analysis presents an overview of the frequency with which migration driving factors are examined and evaluates the robustness of their statistical significance and effect direction.

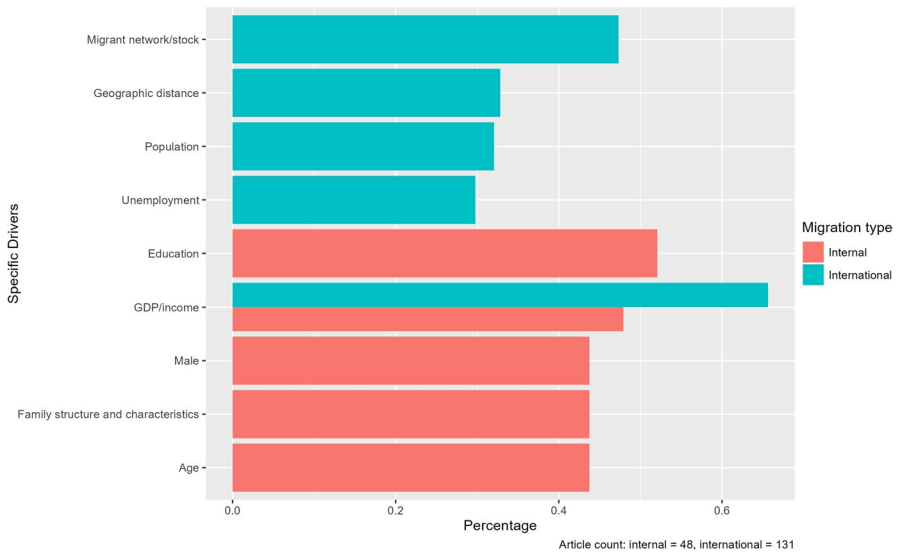


Fig. 3 Frequency analysis of specific drivers studied in $N = 176$ articles. Source: own elaboration based on QMD. Source: own elaboration based on QMD. *In the original schema of Czaika and Reinprecht (2020), these factors are not under the Individual driver dimension. Article count: Internal = 48, international = 131

Research Frequency of Migration Drivers

Figure 2 illustrates the five most frequently examined driving factors, categorized by the type of migration—internal or international. It is evident from Fig. 2 that there are disparities between internal and international migration regarding the driving factors under scrutiny. Notably, “population dynamics” and “labor markets and employment” are exceptions to this pattern.

Figure 3, akin to Fig. 2, presents the analysis at the level of specific drivers’ aggregation. Fig. 3 reveals that, for internal migration, age, gender, and family structure emerge as the most extensively investigated specific drivers. These three specific drivers fall within the broader driver category of “population dynamics,” which, as depicted in Fig. 2, ranks as the most frequently analyzed driving factor. In contrast, specific drivers linked to income hold the distinction of being the most frequently analyzed factors in international migration. Collectively, these figures imply that individual and familial elements such as age, gender, and education are frequently examined concerning internal migration, while international migration research predominantly leans toward country-level variables such as distance and migration stock.

This pattern becomes even clearer in Table 1, which shows the most frequently occurring driver dimensions and driving factors overall. Table 1 reflects how many times a driving factor (dimension) was operationalized, recognizing that a single article can analyze numerous variables related to one driving factor (dimension). Notably, Table 1 demonstrates that all nine driver dimensions and all 24 driving factors were examined at least once.

Table 1 Relative frequency by driver dimension and driving factor

Driver dimension	International (internal)	Driving factor	International (internal)
Demographic	19.1 (33.9)	Family size & structure	5.1 (16.3)
Economic	20.4 (16.8)	Population dynamics	13.9 (17.5)
		Economic & business conditions	9.6 (3.3)
Environmental	3.7 (6.9)	Labour markets & employment	8.5 (8.1)
		Poverty & inequality	1.0 (1.3)
		Urban/rural development & living standards	1.1 (4.6)
		Climate change & environmental conditions	1.9 (6.3)
		Natural disasters & environmental shocks	1.8 (6)
Human development	1.6 (2.8)	Education services & training opportunities	0.9 (2.2)
Individual resources	14.4 (27.6)	Health services & situation	0.7 (0.6)
		Migrant aspirations & attitudes	4.2 (6.9)
Politico-institutional	11.0 (6.1)	Cultural norms & ties*	(1.8)
		Migrant communities & networks*	0.1
		Personal resources & migration experience	10.0 (18.9)
		Civil & political rights	2.2 (.3)
		Migration governance & infrastructure	0.2
		Migration policy & other public policies	5.3
		Public infrastructure, services & provisions	3.2 (5.8)
		Conflict, war, & violence	3.5 (-4)
		Political situation, repression & regime transitions	1.4 (1)
		Cultural norms & ties	0.9 (1.2)
Security	4.9 (0.6)	Gender relations	0.2 (1.0)
		Migrant communities & networks	7.5 (1.2)
Socio-cultural	8.6 (3.4)	Globalization & (post)colonialism	3.3
		International relations & geopolitical transformations	0.7 (0.4)
Supranational	15.7 (1.5)	Transnational ties	11.7 (1.0)

The demographic dimension holds prominence in both internal and international migration research, although the driving factor “family size and structure” garners more attention in the context of internal migration than in international migration. While the table does not explicitly convey this, it is likely, at least among the articles included in the QMD, that analyses of internal migration more frequently utilize individual survey data. This allows for the operationalization of variables related to family size and structure, contributing to its greater prominence. The heightened significance of the “individual resources” dimension in internal migration supports this notion. Conversely, the “security” dimension ranks as the third smallest dimension in international migration and the smallest for internal migration. This observation may reflect that, in many countries, security-related drivers are not considered highly relevant, or it could be due to the challenges in obtaining data, especially for internal migration, in regions facing conflict. Therefore, it is important to note that Table 1 should not be interpreted as an indication of the relative importance of migration drivers within the literature on migration.

Figure 4 illustrates the number of different driving factors analyzed per article. Notably, for both internal and international migration, approximately 19% of the articles examined seven distinct migration factors. Interestingly, more than 75% of the articles analyzed only one-third or fewer of the 24 driving factors.

It is important to note that the limited analysis of driving factors in the articles is not necessarily problematic. Presumably, migration researchers are cognizant of the need to exclude certain migration factors from their analyses. Factors may be omitted if they are theoretically irrelevant to the research context or sample of cases. For example, the consideration of the “political situation, repression, and regime change” driver is likely unnecessary in an analysis of internal migration within Austria over the past 10 years. Another explanation for the restricted analysis of driving factors could be data availability. Articles relying on administrative data, which are frequently aggregated beyond the individual level, may lack data pertaining to drivers within the “individual resources” dimension. Multicollinearity and over-specification could also influence the decision to limit the number of analyzed migration drivers.

Statistical Significance of Estimates

Figures 5 and 6 depict the frequency with which specific drivers of international and internal migration, respectively, attain statistical significance ($p < .05$). It is important to note that, at this stage, we do not consider the direction of the effect, as variables with different expected directions often fall under the same specific driver category. We present here only the most frequently studied drivers due to the sheer volume of data (a comprehensive table is available upon request).

In both plots, the Y-axis represents the percentage of cases in which a factor achieved statistical significance ($p < .05$), regardless of the effect direction. The X-axis corresponds to the number of articles that included the factor in their analysis. The size of each data point reflects the total number of times the driver was

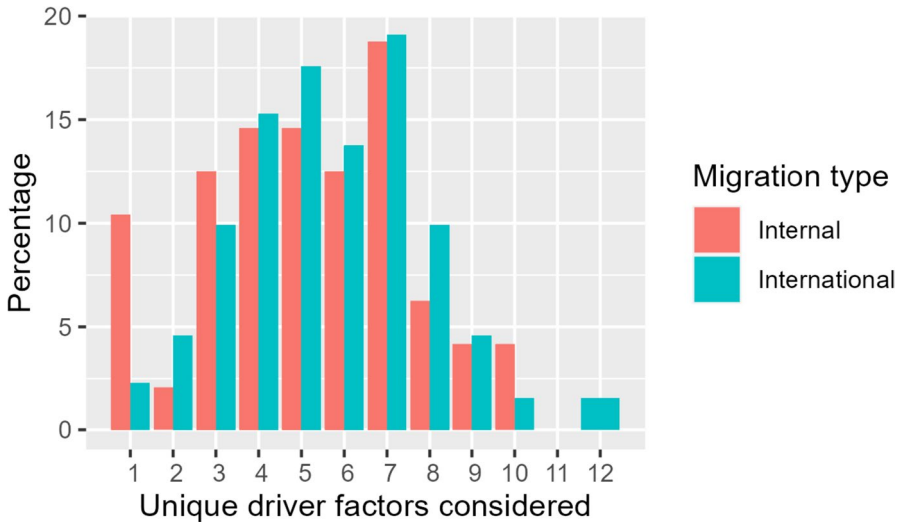


Fig. 4 Number of migration driving factors analyzed per article. Internal articles $n = 48$, international articles $n = 131$

examined. Certain drivers may appear multiple times in a given analysis, as multiple variables are often categorized under the same specific category of influence. For instance, an article might incorporate both GDP per capita and GDP growth variables in the same regression, both of which would fall under the specific driver “GDP/Income.” In such cases, while the number of drivers is two, the number of articles is only one.

Starting with the drivers of international migration (Fig. 5), several specific factors achieve statistical significance in over 70% of cases, with “geographic distance” leading at approximately 85%. Surprisingly, “conflict/violence” registers statistical significance only around 45% of the time. This disparity might suggest that conflict and violence play a less significant role as causes for international migration compared to internal migration. Alternatively, there could be a discrepancy between the theoretical relevance of the variable and its practical operationalization (Pettersson, 2022). Notably, “geographic distance” consistently exhibits statistical significance. Not surprisingly, this specific driving factor, historically one of the earliest studied in migration research (Ravenstein, 1885), maintains high statistical significance. However, more recently, it and other similarly robust factors like “borders/common region” have become less frequent in analyses, as these time-invariant variables are often accounted for by fixed effects in regression models.

The results for internal migration (Fig. 6) reveal that only “family structure and characteristics” achieves a statistically significant frequency above 70%. Many other specific factors hover at or below the 50% mark. Surprisingly, the socio-demographic factors “dependent children” and “male” exhibit the lowest frequencies at 25% and 23%, respectively. This finding is perplexing, given that “male” is typically operationalized as a binary variable (male or female), and “dependent children”

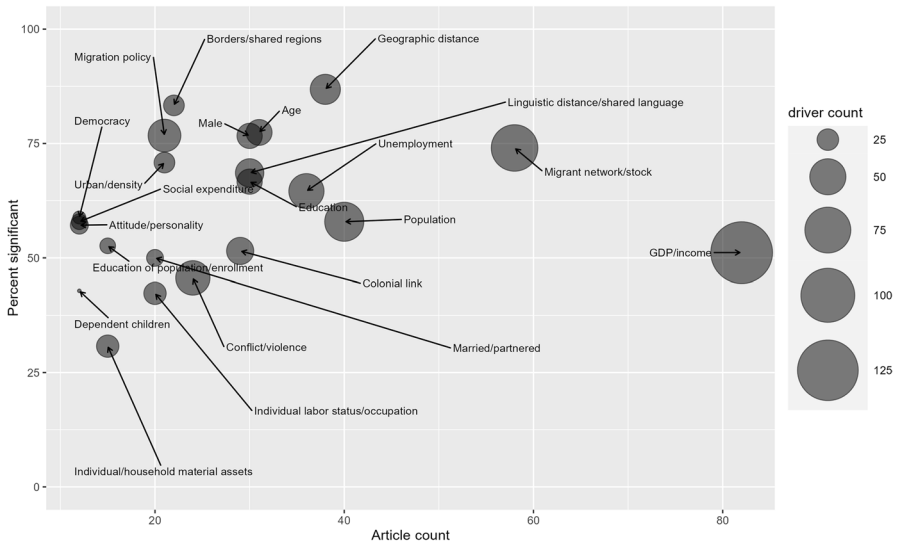


Fig. 5 Statistical significance of most frequent specific drivers in international migration at the specific driver level. Note: statistically significant result at $p < .05$. Own elaboration based on QMD

follows the same pattern. It is possible that the “male” variable might register statistical significance more often if the articles in the driver dataset only analyzed data prior to the 1970s when the share of female migrants was smaller compared to the twenty-first century (Gabaccia, 2016). Fig. 6 does not indicate whether the significance of the “male” variable has decreased or increased since 2000.

The “dependent children” driver exhibits variations in operationalization, as some articles differentiate regarding the age, number, and/or sex of children. These results suggest that it may be worthwhile for researchers to reevaluate whether a binary “dependent children” variable is the best approach or whether it would be more theoretically meaningful to consider the age, number, and/or gender of children. Fig. 6 does not provide insights into whether variables related to dependent children are more likely to attain statistical significance when they account for the age, number, and/or gender of the children.

One intriguing discovery is that for international migration, the “male” variable is statistically significant approximately 75% of the time, whereas for internal migration, it is statistically significant only about 25% of the time. This observation suggests that this gender-related driver holds greater relevance for international migration than for internal migration. Similar graphs at the driving factor level can be found in the Appendix.

Next, we delve into the analysis at the variable level. It is important to note that the variable level may not always precisely mirror the terminology used within the articles but is instead an approximation. Both Figs. 7 and 8 should be interpreted in the following manner: a positive effect implies an increase in migration. When examining destination country variables, this signifies a higher volume of migration to the destination country. For country-of-origin variables, it indicates increased

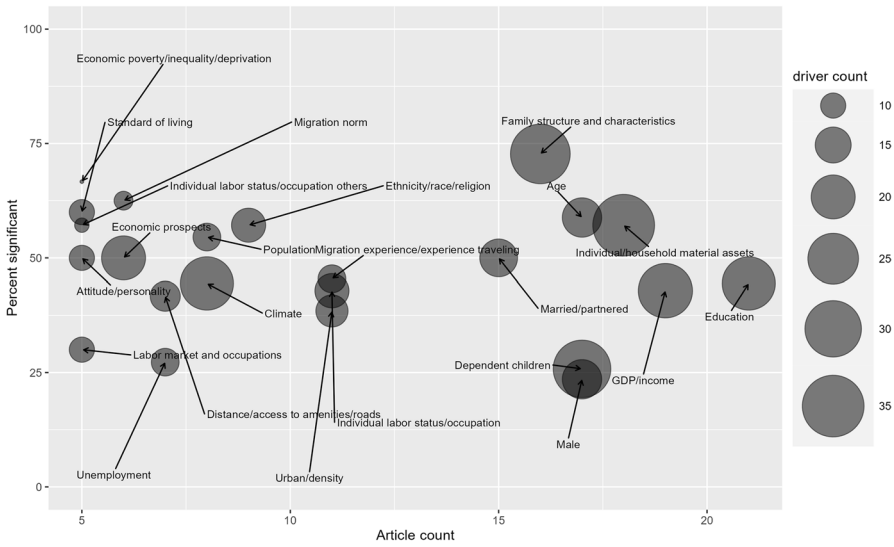


Fig. 6 Statistical significance of most frequent specific drivers of internal migration at the specific driver level. Note: statistically significant result at $p < .05$. Own elaboration based on QMD

migration from the country of origin. At this level of specificity, considering the variable perspective, it becomes more appropriate to examine both the direction of the effect and its statistical significance. Even at this level of granularity, there can still be considerable variation in the precise operationalization of variables. For example, education can be measured in years or as ordinal categories, with the specific categories varying from one article to another. However, as previously mentioned, some variables, such as “male” and “common border,” maintain consistent operationalization.

Figure 7 highlights variables that have been employed in analyses of international migration at least 15 times. For international migration, we further divide the analysis into four perspectives. For instance, the “unemployment rate,” which is a destination country variable, appears at least 15 times, as does the same variable as a source (origin) country variable. Consequently, it is featured in both headings. In contrast, the “shared border” variable only appears in the heading of dyadic variables, which pertain to variables related to both the country of origin and the country of destination. The individual-level variables encompass micro-level factors, such as the gender of the migrant or potential migrant.

One characteristic of Fig. 7 is that more variables found a positive significant effect than a negative significant effect. This reflects the bias in framing mobility over immobility. Bilateral migration stock facilitates immigration, but framed differently the absence of this stock hinders immigration. This bias toward mobility has in recent years been challenged as immobility is emphasized (Schewel, 2020). In terms of the direction of effects, ignoring statistical significance, the destination and dyadic variables follow what one would expect from theory and tend to be heavily in one direction. The least biased in one direction was “shared borders” which was still in the positive direction

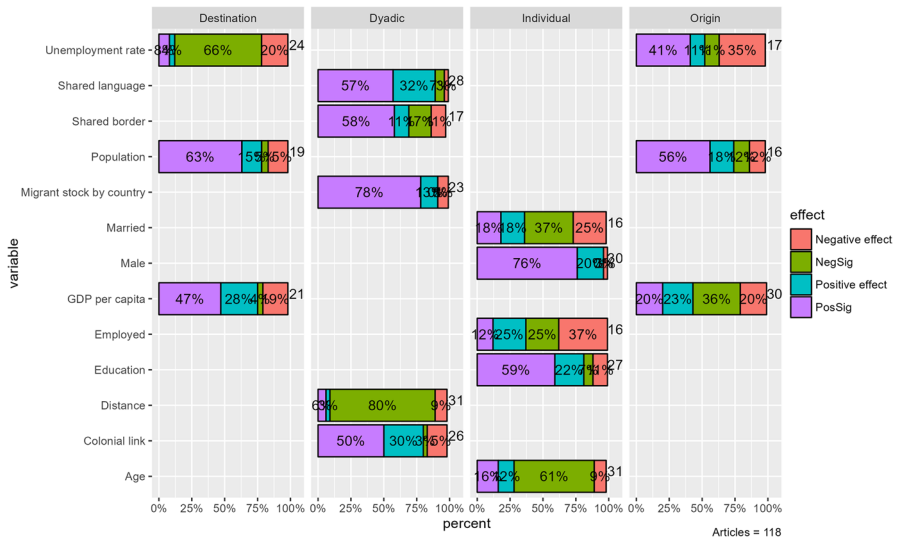


Fig. 7 Driver of international migration: most common variables, effect direction and statistical significance. Source: own elaboration based on QMD. Numbers at end of bar indicate total number of observations. Variables with less than 15 observations are not shown. Non-binary variables unemployment rate, population, migrant stock by country, GDP per capita, age, and education are coded such that more of the variable leads to given effect direction

69% of the time. The individual and especially origin level variables were less biased in one direction. The effect direction of origin country GDP per capita and unemployment rate was closely split to where around half the time a positive effect was found and around half the time a negative effect was found. This pattern may be reflective of the inverted U-shaped relationship between emigration and development (Zelinsky, 1971).

Concerning internal migration (Fig. 8), we exclusively present results related to individual-level variables, as other perspectives were not sufficiently represented. One notable difference between Fig. 8 and Fig. 7 is that in Fig. 8 there is a lack of positive significant effects. The highest percentage reached for a positive significant effect is 25% for the education variable. The two most consistent variables in terms of direction were owning a home and being male. At the individual level, similar variables are considered for both domestic and international migration. Figs. 7 and 8 demonstrate that the influential factor “male” exhibits a predominantly positive effect but is more pronounced in the context of international migration, where it is significantly more likely to have a statistically significant impact (76% versus 23%). Being married for both internal and international migration was most often found to have a negative effect, but only 57% of the time for internal migration and 62% of the time for international migration.

Understanding Variations in the Direction of Effect: the Income Variable

Determining the specific reasons behind why some variables consistently exhibit a particular direction of effect compared to others is a complex task. Multiple factors

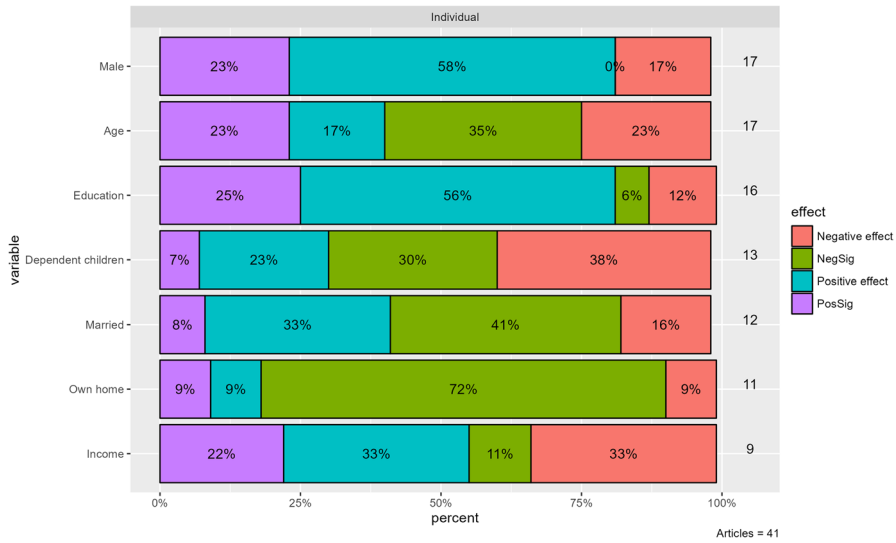


Fig. 8 Driver of internal migration: most common variables, effect direction and statistical significance. Source: own elaboration based on QMD. Numbers at end of bar indicate total number of observations. Variables with less than 9 observations are not shown. Non-binary variables age, education, and income are coded such that more of the variable leads to given effect direction

come into play, encompassing the operationalization of the variable, the nature of the dependent variable, the statistical model chosen, the inclusion of other control variables, and the breadth of the analysis concerning observation periods and countries involved. To elucidate this intricacy, we will delve into a detailed examination of the specific impact of “per capita income” at the destination country level on international migration.

Figure 7 underscores a noteworthy finding among the 21 analyzed articles: destination country GDP per capita demonstrated a positive effect on international migration in (only) 75% of cases. To delve deeper into the reasons behind the varying findings within studies employing GDP per capita as an indicator, we will closely examine the differences among them.

Table 2 provides a comprehensive overview of these variations, encapsulating aspects such as sample selection, choice of dependent variable, listing of all articles in the QMD dataset that reported either a negative or a positive effect for destination country GDP per capita.³ Even for seemingly straightforward variables like per capita income, there exist disparities in operationalization. However, regarding sample and operationalization, a consistent pattern distinguishing articles reporting positive from negative effects was elusive. Instead, the primary distinction lay in the choice of dependent variable. Notably, three out of the six articles reporting a negative

³ Please note that this table was not directly extracted from QMD data, as it lacks detailed information on estimation coefficients. Instead, we identified these articles in the QMD and gathered the necessary details from them. Standardizing all coefficients wasn't feasible, so drawing conclusions based on differences in effect size would be misleading.

effect employed asylum applications or irregular migration as their dependent variable, while a similar measure was used by three out of fourteen articles reporting a positive effect.

It is worth noting that Table 2 does not encompass all variations. Discrepancies exist both between and within articles concerning the statistical models employed. The QMD database lacks complete coverage of all results for a variable across various models within an article. This is a crucial point because upon closer examination of the findings within these articles, four out of six articles that the QMD reports as having found a negative effect for per capita income also identified a positive effect in at least one of their models (Backhaus et al., 2015; Docquier et al., 2014; Toshkov, 2014; Yoo & Koo, 2014). In contrast, only two out of fourteen articles that the QMD reports as having found a positive effect for per capita income found a negative effect in at least one of their models (Hatton & Moloney, 2015; Ortega & Peri, 2013). This finding aligns with the notion that, for asylum seekers and irregular migrants, economic factors tend to assume a secondary role compared to other determinants (Czaika & Reinprecht, 2020). Furthermore, there are additional variations not presented in Table 2, such as whether dependent and independent variables are lagged and the duration of the lag.

Another factor contributing to the observed variation could be the choice of control variables in individual studies. Table 3 provides a compilation of the most frequently utilized variables and combinations thereof. These variables were incorporated into models that generated the estimates presented in Table 2. With the exception of the unemployment rate in the destination country, there is minimal overlap in the control variables employed between studies that reported a negative effect for GDP per capita and those that identified a positive effect. None of the other variables reached a usage rate of at least 50% in either group. Furthermore, no combination of variables achieved such prominence in either group.

Among the variables considered, the most common combination across both groups was the inclusion of GDP growth in the destination country and the unemployment rate in the destination country. These variables featured in 33% of the models within the negative effect group and 57% of the models within the positive effect group. Even when examining individual groups, there is limited concurrence in terms of variables or combinations of variables employed. Table 3 enumerates all variables and combinations that appeared in at least two of the six articles reporting a negative effect. In contrast, for articles demonstrating a positive effect, not all variables and combinations are listed to avoid an excessively lengthy table. Nonetheless, within this latter group, there is scant overlap as the maximum number of common variables across at least three articles is four, with examples including distance, common border, unemployment rate, and origin of unemployment rate, all used as control variables in three distinct articles.

Variations exist not only in the control variables employed between studies reporting either a negative or positive effect for per capita income but also within these groups. Consequently, it is challenging to attribute the disparities in the effect direction of per capita income solely to differences in control variables. Consider the case of two articles, Adsera and Pytlikova (2015) and Backhaus et al. (2015), which share numerous similarities yet arrive at different conclusions regarding the effect

Table 2 Estimated effects of destination GDP per capita on international immigration

Article	Time period	Destination countries	Dependent variable	GDP	Coefficient
Jennissen (2003)	1960–1998	Western Europe	Net migration rate x 1000	GDP per cap x 10 ⁻⁸	7.32
Neumayer (2004)	1982–1999	17 European countries	Share of asylum seekers relative to the total number of asylum seekers in Western Europe	Ln GDP per cap	0.073 [*]
Gross (2007)	1981–1995	Switzerland	Worker inflow	GDP per cap	0.325
Hooghe et al. (2008)	1980–2004	European countries	Immigration inflows	GDP per cap	- 0.044
Belot and Ederveen (2012)	1990–2003	OECD	Immigration inflows	GDP per cap ppp	0.049 [*]
Giulietti et al. (2013)	1993–2008	European countries	Non-EU immigration inflows	GDP per cap	0.019 [*]
Ortega, F., and Peri, G. (2013)	1980–2006	Western countries	Bilateral migration flow	Ln GDP per cap	0.76 [*]
Sprenger (2013)	2000–2009	EU 21	Immigration inflows	GDP per cap ppp	0.086 [*]
Docquier, F., Peri, G., and Ruyssen, I. (2014)	2000–2010	30 major receiving countries	Net migration rates (m x 100) of the less Educated	GDP per cap ppp	- 0.00004
Ruyssen et al. (2014)	1998–2007	OECD	In immigration inflows developing origin countries	Ln GDP per cap	1.58 [*]
Toshkov (2014)	1987–2010	European countries	Asylum application	GDP per cap	- 0.01 [°]
Yoo, E., and Koo, J. W. (2014)	1982–2008	89 countries	In asylum application	Ln GDP per cap	- 0.46 [*]
Adsera, A., and Pytlíkova, M. (2015)	1980–2010	OECD	In gross flows	GDP per cap ppp	1.6 [*]
Jennissen and van Wissen (2015)	1985–2005	Western Europe and northern Europe	Asylum applications	GDP per cap	0.19
Hatton, T., and Moloney, J. (2015)	1997–2012	19 OECD	In asylum application	Ln GDP per cap	0.082
Backhaus, A., Martínez-Zarzoso, I., and Muris, C. (2015)	1995–2006	OECD	In inflow	GDP per cap ppp 1000	- 0.01 [*]
Palmer and Pytlíkova (2015)	2004–2010	EU/EFTA	In migration rate origin to destination	GDP per cap	2.6* [°]
Czajka and Hobolth (2016)	2008–2011	European countries	In irregular migration	Ln GDP per cap ppp	- 2.5 [*]
Czajka and de Haas (2017)	1973–2012	38 countries	Immigration inflows	GDP per cap	0.013 [*]
Gorinas and Pytlíkova (2017)	1980–2010	30 countries	In immigration inflow	Ln GDP per cap ppp	0.39 [* , +]

+ = Standardized value. * = significant at $p < .05$. ° = article did not provide exact estimates but points on a graph, values here are approximations. Ln = logged. ppp = purchasing power parity

of GDP per capita. Both studies cover similar time periods, use year dummies, destination countries, and dependent variables, and they operationalize GDP per capita similarly. Furthermore, when it comes to driver dimensions, both studies share a variable categorized under the demographic, economic, and supranational dimensions. However, distinctions emerge in the variables incorporated in each article. Specifically, Backhaus et al. (2015) emphasize environmental variables and feature fewer variables overall, whereas Adsera and Pytlikova (2015) exclude environmental factors. Backhaus et al. (2015) also include variables related to security dimensions, while Adsera and Pytlikova (2015) use variables related to human development, political-institutional, and sociocultural dimensions. Backhaus et al. (2015) employ a first-difference estimator, while Adsera and Pytlikova (2015) opt for a Poisson fixed-effects model for the country of origin and the country of destination. It is not possible to discern how much of the divergence in their findings are due to differences in variables used or the statistical model.

Conclusion

The systematic meta-analysis conducted here, which examines studies that conducted quantitative analysis on migration drivers published over the past two decades, reveals a distinct research emphasis on certain key factors considered pivotal. These studies predominantly delve into economic conditions, migrant communities/networks, labor markets, population dynamics, personal resources, transnational ties, family structures, and public infrastructure and utilities. However, there is a noticeable dearth of attention given to areas like cultural norms and ties, health services, educational and training opportunities, and geopolitical changes. These factors are comparatively underexplored in migration research. Intriguingly, some of these less-explored factors, such as the role of health services, have displayed statistical significance (refer to Figure 9 in the [Appendix](#)), albeit with relatively small sample sizes. The infrequent analysis of these factors might be attributed, in part, to the challenges associated with their operationalization.

In the realm of both internal and international migration, it becomes evident that numerous factors exhibit statistical significance roughly around 50% of the time, while several others fall considerably below this threshold. The underlying reasons for this variance remain challenging to pinpoint, but the outcomes strongly hint at substantial room for enhancement. This variability may arise from a multitude of factors, including the potential inadequacy in the conceptualization of migration theory informing the inclusion of these drivers. More plausibly, it could be attributed to difficulties encountered when translating theoretical frameworks into operationalized variables (Carling et al. 2020). Alternatively, the limited number of influencing factors considered might also play a role. Notably, our investigation reveals that the majority of articles related to both internal and international migration encompass variables that address merely seven out of the possible 24 driving factors. Hence, it is advisable for researchers to broaden their scope and encompass a more comprehensive array of migration factors encompassing various dimensions of migration drivers, rather than being overly fixated on singular aspects like economic or environmental factors. It is also essential to

Table 3 Control variables used in studies ($N = 20$) assessing the economic effect of destination country GDP per capita

Control variable (unique and combinations)	Effect of GDP per capita on immigration			Total articles positive
	% negative	Total articles negative	% positive	
Unemployment rate	67%	4	85%	12
Asylum recognition rate	50%	3	7%	1
Population	50%	3	28%	4
GDP growth	33%	2	14%	2
GDP per capita origin	33%	2	64%	9
Shared border	33%	2	42%	6
Social expenditure	33%	2	28%	4
Population origin	33%	2	28%	4
Migrant stock (dyadic)	16%	1	50%	7
Migrant stock (dyadic), unemployment rate	na	na	50%	7
GDP growth, unemployment rate	33%	2	57%	8
Social expenditure, population	33%	2	7%	1
GDP per capita origin, population origin	33%	2	28%	4
Shared border, asylum recognition rate	33%	2	na	na
GDP per capita origin, unemployment rate, unemployment rate origin	na	na	35%	5
GDP per capita origin, unemployment rate, migrant stock (dyadic)	na	na	35%	5
GDP per capita origin, unemployment rate, shared border	na	na	35%	5
Distance, shared border, unemployment rate, education origin	na	na	21%	3
Distance, shared border, unemployment rate, unemployment rate origin	na	na	21%	3
Linguistic distance/shared language, shared border, unemployment rate, unemployment rate origin	na	na	21%	3

Variables refer to the destination country level with exception of those ending with origin and dyadic variables "shared border," "linguistic distance/shared language," "distance," "migrant stock"

be mindful of issues such as overidentification and multicollinearity, as these can have detrimental effects on the statistical significance of variables (Cinelli et al., 2022).

In the realm of migration factors, there exists a broad spectrum of methodologies for operationalizing variables, a diversity most evident when examining economic conditions, specifically per capita income. In our examination of 20 articles for this purpose, we identified four primary approaches to measuring per capita income: GDP per capita, GDP purchasing power parity, and the logarithmic equivalents of these two metrics. Difference in the directional effect of GDP per capita found between articles may be primarily due to differences in dependent variables. Half of the articles that find a negative effect for GDP per capita use asylum applications or irregular migration as the dependent variable. Moreover, many of the articles that find a negative effect for GDP per capita in their main model also find a positive effect in some of their specifications, while relatively few articles that find a positive effect for GDP per capita in their main model also find a negative effect in their other specifications. Still, there are articles with conflicting results that cannot be explained by differences in dependent variable, operationalization of GDP per capita, or sample. In this case, differences are most likely due to differences in independent variables and statistical model. Regrettably, our analysis does not provide definitive guidance on the optimal approach for the analysis of the effect of GDP per capita on migration or any other migration factors. The decision-making process should ideally be theory-driven, encompassing not only operationalization but also the selection of migration factors and their combinations. It is plausible that many researchers adhere to a “good practice” principle, adopting established methodologies prevalent within their specific research domain. Nevertheless, our findings strongly indicate that, for numerous migration factors, a critical reevaluation of conceptualization and operationalization may be overdue.

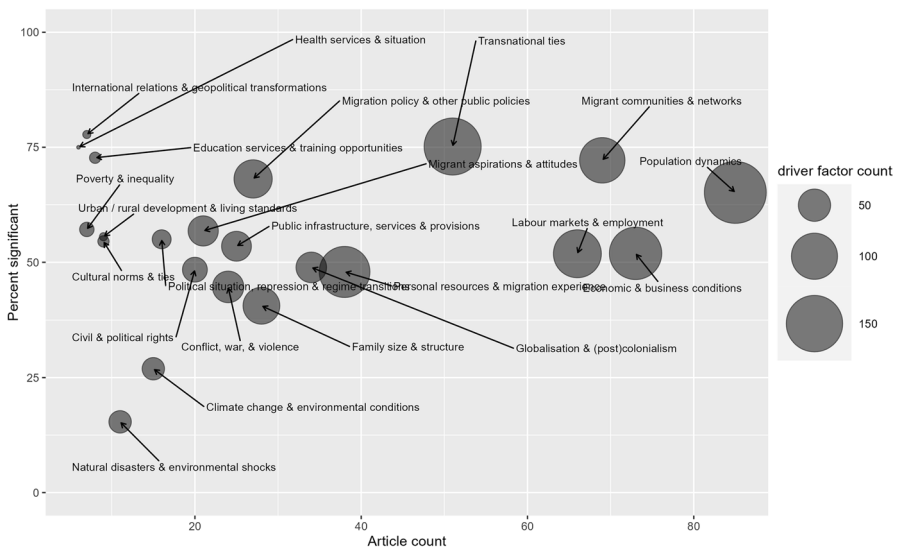


Fig. 9 Statistical significance of most frequent driving factor of international migration, level

In a broader context, our findings align with previous meta-analyses, demonstrating a certain consistency in the field. Specifically, factors related to education tend to exhibit predominantly positive effects, corroborating the observations made by Soon (2013). Moreover, our analysis underscores the robustness of several influential factors, including education, geographic distance, migrant networks, unemployment, and population size, which echoes the findings of Pitoski et al. (2021). These factors maintain their stability, particularly in the context of international migration. Notably, our study also reaffirms the significance of certain drivers of migration aspirations, such as migrant networks, which were previously identified as robust influencers by Aslany et al. (2021) and continue to play a substantial role in actual migration, as evidenced in our analysis.

In summary, the meta-analysis conducted in this study offers a valuable tool for future research endeavors. It not only highlights which migration factors have received insufficient attention but also identifies those factors that frequently lack statistical significance, thereby suggesting the need for a more refined approach in their operationalization.

Appendix

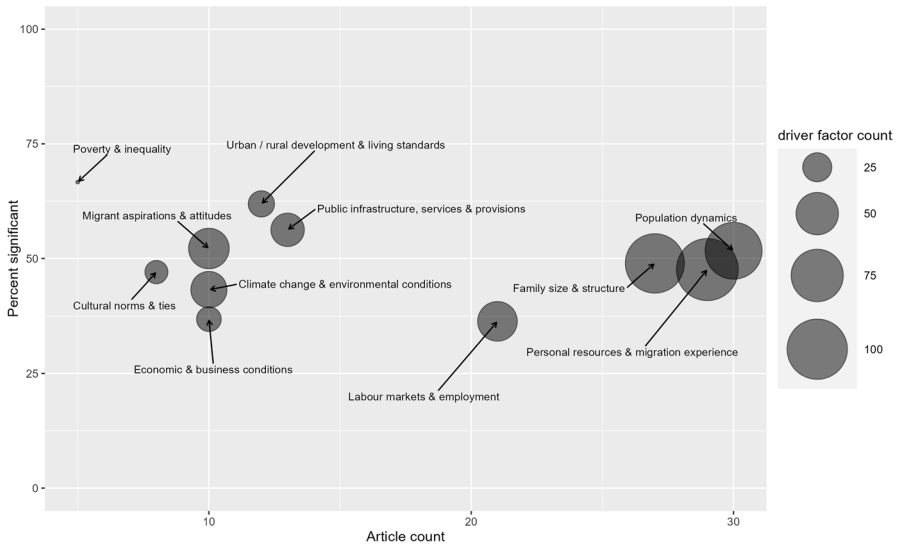


Fig. 10 Statistical significance of most frequent driving factor in internal migration, driving factor level

Acknowledgement We are very grateful for insightful comments and advice from Heidrun Bohnet, Ali Safi, and Zina Weisner.

Funding Open access funding provided by Danube University Krems University for Continuing Education. This research has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 870299.

Data Availability The dataset and code to reproduce results are available upon request.

Declarations

Conflict of Interest The authors declare no conflict of interest.

Open Access This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

References

- Adsera, A., & Pytlikova, M. (2015). The role of language in shaping international migration. *The Economic Journal*, 125(586), F49–F81.
- Aslany, M., Carling, J., Mjelva, M. B., & Sommerfelt, T. (2021). *Systematic review of determinants of migration aspirations*. QuantMig Project Deliverable D2.2. Southampton: University of Southampton.
- Backhaus, A., Martinez-Zarzoso, I., & Muris, C. (2015). Do climate variations explain bilateral migration? A gravity model analysis. *IZA Journal of Migration*, 4(1), 1–15.
- Beine, M., & Jeusette, L. (2021). A meta-analysis of the literature on climate change and migration. *Journal of Demographic Economics*, 87(3), 293–344.
- Belot, M., & Ederveen, S. (2012). Cultural barriers in migration between OECD countries. *Journal of Population Economics*, 25(3), 1077–1105.
- Carling, J., Czaika, M., & Erdal, M. B. (2020). Translating Migration Theory Into Empirical Propositions. *QuantMig Project Deliverable 1.2*. Southampton: University of Southampton.
- Cinelli, C., Forney, A., & Pearl, J. (2022). A Crash Course in Good and Bad Controls. *Sociological Methods & Research*, 1, 34.
- Czaika, M., & Reinprecht, C. (2020). *Drivers of migration. A synthesis of knowledge*. IMI (International Migration Institute) working paper No. 163.
- Czaika, M., & de Haas, H. (2017). The effect of visas on migration processes. *International Migration Review*, 51(4), 893–926.
- Czaika, M., Erdal, M. B., & Talleraas, C. (2021). *Theorising the interaction between migration-relevant policies and migration driver environments*. QuantMig Project Deliverable D1.1. Southampton: University of Southampton.
- Czaika, M., & Hobolth, M. (2016). Do restrictive asylum and visa policies increase irregular migration into Europe? *European Union Politics*, 17(3), 345–365.
- Docquier, F., Peri, G., & Ruysen, I. (2014). The cross-country determinants of potential and actual migration. *International Migration Review*, 48(1_suppl), 37–99.
- Gabaccia, D. R. (2016). Feminization of migration. In *The Wiley Blackwell Encyclopedia of gender and sexuality studies* (pp. 1–3).
- Giulietti, C., Guzi, M., Kahanec, M., & Zimmermann, K. F. (2013). Unemployment benefits and immigration: Evidence from the EU. *International Journal of Manpower*, 34(1), 24–38.

- Gorinas, C., & Pytliková, M. (2017). The influence of attitudes toward immigrants on international migration. *International Migration Review*, *51*(2), 416–451.
- Gross, D. M. (2007). Immigration Incentives and Policy in Switzerland. In Ç. Özden & M. Schiff (Eds.), *International Migration Economic Development and Policy* (pp. 183–214).
- Hatton, T., & Moloney, J. (2015). *Applications for asylum in the developed world: Modelling asylum claims by origin and destination*. CEPR Discussion Paper No. DP10678.
- Hoffmann, R., Dimitrova, A., Muttarak, R., Cuaresma, J. C., & Peisker, J. (2020). A meta-analysis of country-level studies on environmental change and migration. *Nature Climate Change*, *10*(10), 904–912.
- Hooghe, M., Trappers, A., Meuleman, B., & Reeskens, T. (2008). Migration to European countries: A structural explanation of patterns, 1980–2004. *International Migration Review*, *42*(2), 476–504.
- Jennissen, R. (2003). Economic determinants of net international migration in Western Europe. *European Journal of Population/Revue Européenne de Démographie*, *19*(2), 171–198.
- Jennissen, R., & van Wissen, L. (2015). The distribution of asylum seekers over Northern and Western European countries, 1985–2005. *Genus*, *71*(1), 109–132.
- Kuhnt, J. (2019). *Literature review: Drivers of migration. Why do people leave their homes? Is there an easy answer? A structured overview of migratory determinants*. No. 9/2019. Discussion Paper.
- Neumayer, E. (2004). Asylum destination choice: What makes some West European countries more attractive than others? *European Union Politics*, *5*(2), 155–180.
- Ortega, F., & Peri, G. (2013). The effect of income and immigration policies on international migration. *Migration Studies*, *1*(1), 47–74.
- Palmer, J. R. B., & Pytlikova, M. (2015). Labor market laws and intra-European migration: The role of the state in shaping destination choices. *European Journal of Population*, *31*(2), 127–153.
- Pettersson, Therese. “UCDP/PRIO Armed Conflict Dataset Codebook v 22.1” (<https://ucdp.uu.se/downloads/>). (2022)
- Pisarevskaya, A., Levy, N., Scholten, P., & Jansen, J. (2020). Mapping migration studies: An empirical analysis of the coming of age of a research field. *Migration studies*, *8*(3), 455–481.
- Pitoski, D., Lampoltshammer, T. J., & Parycek, P. (2021). Drivers of human migration: A review of scientific evidence. *Social Sciences*, *10*(1), 21.
- Ravenstein, E. G. (1885). The laws of migration. *Journal of the statistical society of London*, *48*(2), 167–235.
- Ruysen, I., Everaert, G., & Rayp, G. (2014). Determinants and dynamics of migration to OECD countries in a three-dimensional panel framework. *Empirical Economics*, *46*(1), 175–197.
- Schewel, K. (2020). Understanding immobility: Moving beyond the mobility bias in migration studies. *International migration review*, *54*(2), 328–355.
- Soon, J.-J. (2013). A meta-analysis of the impact of education on migration. *Journal of Trends in Economics Management & Technology*, *2*(4), 35–41.
- Soto Nishimura, A. (2022) Migration drivers data inventory records, 2000–2019: Data Inventory. Online resource, available at https://www.quantmig.eu/migration_driver_inventory/. Accessed 4 Apr 2023.
- Soto Nishimura, A., & Czaika, M. (2022). Migration drivers database. *QuantMig Project Deliverable D5.6*. Southampton: University of Southampton.
- Sprengr, E. (2013). *The determinants of international migration in the European Union: An empirical analysis*. No. 325. IOS Working Papers.
- Toshkov, D. D. (2014). The dynamic relationship between asylum applications and recognition rates in Europe (1987–2010). *European Union Politics*, *15*(2), 192–214.
- Van Hear, N., Bakewell, O., & Long, K. (2018). Push-pull plus: reconsidering the drivers of migration. *Journal of ethnic and migration studies*, *44*(6), 927–944.
- Yoo, E., & Koo, J.-W. (2014). Love thy neighbor: Explaining asylum seeking and hosting, 1982–2008. *International Journal of Comparative Sociology*, *55*(1), 45–72.
- Zelinsky, W. (1971). The hypothesis of the mobility transition. *Geographical review*, *61*(2), 219–249.