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Measuring Irregular Migration

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Assessing the Feasibility, Scalability and Validity of Innovative Methods for Estimating Irregular Migration

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AUTHORS:

Alejandra Rodríguez Sánchez

Jasper Tjaden

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Executive Summary

This working paper presents an assessment of the feasibility, scalability, and validity of estimates of irregular migration stocks and flows, based on six pilot studies conducted within the framework of the MIrreM project. The pilot studies made innovative use of 1) flight passenger data, 2) social media data, 3) mortality register data, 4) register health care data, and 5) labour force surveys. We examine the key dimensions of each of these three concepts and evaluate how they apply to each pilot study. With one exception, all studies were found to be feasible. Several also demonstrated scalability; however, limited data availability across different geographic contexts or time periods remains a significant challenge. Validity, in particular, continues to be the most elusive component due to the absence of a definitive reference standard. Nevertheless, the estimates produced showed a notable degree of alignment with existing data sources and, in some cases, a non-negligible level of internal consistency across countries when comparable estimates were available. Overall, the pilot studies represent a meaningful step forward in the empirical study of irregular migration, offering promising methodologies that warrant further development and replication.

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THE MIRREM PROJECT

MIrreM examines estimates and statistical indicators on the irregular migrant population in Europe as well as related policies, including the regularisation of migrants in irregular situations.

MIrreM analyses policies defining migrant irregularity, stakeholders' data needs and usage, and assesses existing estimates and statistical indicators on irregular migration in the countries under study and at the EU level. Using several coordinated pilots, the project develops new and innovative methods for measuring irregular migration and explores if and how these instruments can be applied in other socio-economic or institutional contexts. Based on a broad mapping of regularisation practices in the EU as well as detailed case studies, MIrreM will develop 'regularisation scenarios' to better understand conditions under which regularisation should be considered as a policy option. Together with expert groups that will be set up on irregular migration data and regularisation, respectively, the project will synthesise findings into a Handbook on data on irregular migration and a Handbook on pathways out of irregularity. The project's research covers 20 countries, including 12 EU countries and the United Kingdom.

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1. INTRODUCTION

How to assess the feasibility, scalability and validity of pilot studies aimed at estimating irregular migration stocks and flows.

Estimating the stocks or flows of irregular migrants represents one of the most challenging endeavours in migration research. Traditional approaches that successfully capture other migrant populations prove inadequate when applied to irregular migrants, who actively seek to remain hidden from official registers and are significantly more likely to refuse participation in surveys or censuses (i.e., the conventional tools to study populations in social science research). To address these fundamental methodological challenges, within the context of MIrreM project, we developed six pilot studies that explore innovative approaches to measuring irregular migration, based on our review of traditional and innovative approaches (Rodríguez-Sánchez & Tjaden, 2023a). Each study employs distinct methodologies, data sources, and analytical frameworks, providing a comprehensive examination of alternative measurement strategies.

This document presents succinct definitions of feasibility, scalability, and validity, along with their respective dimensions, before examining how the different pilot studies perform against these criteria. This systematic assessment framework allows for rigorous comparison of these innovative methodological approaches across multiple dimensions of research. The pilot studies presented here were developed independently, employing different approaches, data sources, or both. This independence ensures methodological diversity while allowing for some degree of internal cross-validation. Several studies provide estimates for the same countries, enabling direct comparison of results across different methodologies.

We conclude this report by discussing broader methodological considerations not directly addressed by individual studies. A feasible, scalable, and valid approach designed to estimate irregular migrant stocks can, in principle, be adapted to estimate irregular migration flows by examining temporal changes in estimated populations. Conversely, a robust method for estimating irregular migration flows can provide lower bounds for stock estimates when combined with appropriate reference values or baseline measurements. Our analysis examines which approaches demonstrate the greatest potential for these extended applications, considering their methodological foundations, data requirements, and implementation constraints. We also offer a reflection on the potential risks associated with applying these methods in other contexts and time periods. This assessment contributes to a broader understanding of how different measurement strategies might be integrated or adapted for various research and policy objectives in irregular migration studies.

2. BRIEF SUMMARY OF PILOT STUDIES

A summary of the pilot studies developed in the MIrreM project, highlighting their main characteristics and data sources.

2.1 METHODS INNOVATION LAB

We start this working paper by providing a quick overview of the innovative work done in the context of Methods Innovation Lab led by the University of Potsdam, one of the working packages of MIrreM. Based on the scoping review of traditional and innovative methods to estimate irregular migration done in the context of our work (Rodríguez-Sánchez & Tjaden, 2023a) and together with colleagues from the Consortium, we developed a series of six pilot studies aimed at estimating the stocks or flows of irregular migrants within the context of Europe.

2.2 SUMMARY OF OUR PILOT STUDIES

Table 1 summarizes the key features of the pilot studies we have developed, all of which have been published as Briefing Papers and subsequently expanded into academic papers. These studies draw on both traditional and innovative data sources, combining the strengths of digital data with established methodological approaches. In addition, they introduce novel methodologies to help estimate the size of irregular migrant populations.

The table outlines the core concept behind each method, the definition of irregular migration applied, the data sources used, key assumptions, and the population coverage—that is, the segment of irregular migrants captured by the method. Each of these elements is explored in greater depth in the corresponding Briefing Papers.

The pilot studies vary in geographical and temporal focus. One study (Rodríguez Sánchez & Tjaden, 2025b) offers global estimates, while others are more regionally specific. For instance, Rodríguez Sánchez & Tjaden (2025a) and Salihoğlu & Vargas-Silva (2025) focus on the UK, whereas Surkyn & Bircan (2025) addresses the case of Belgium, and one study targets specific immigrant groups in the U.S. context (Tjaden & Rodríguez-Sánchez, 2025). Another of our pilot studies (Bernasconi & Recchi, 2025) provides estimates of irregular migration flows into the Schengen area, primarily covering Europe.

Table 1 Summary of Pilot studies of the MIrreM project

Pilot Title	Authors	Main Idea	Definition	Data Sources	Assumptions	Coverage
Estimating Undocumented Migration in the UK Using an Exclusionary Health Care Policy Reform	Rodríguez-Sánchez and Tjaden	Uses 2014 NHS policy reforms that restricted healthcare access for migrants lacking valid residency documentation to estimate undocumented migration through changes in GP registrations	Migrants lacking valid residency documentation (referred to as "undocumented migrants")	NHS GP registration data, arrival data, practices serving large migrant populations	Reforms led to reduced GP registrations among new arrivals; this reduction can be used with arrival data in a multiplier method	New arrivals to the UK, particularly those in areas with large migrant populations
Measuring the Participation of Irregular Migrants in the Informal Economy	Salihoğlu and Vargas-Silva	Uses nationally representative survey data to estimate size ranges of irregular migrant worker populations by differentiating between informal/formal economy, unregistered/registered firms, and irregular/regular migration	Irregular migration status intersecting with informal economy participation	Turkish Household Labour Force Survey, UK Labour Force Survey	Method can differentiate between economic informality and migrant irregularity using survey data	Irregular migrant worker populations in Turkey and the United Kingdom
Irregular Migration: What can Mortality Reveal?	Surkyn and Bircan	Uses mortality data as a basis for estimating irregular migrant population through "mortality extrapolation" technique	Mobile populations that can be tracked through mortality data	Belgian mortality data	Mortality can be a reliable basis for gauging size and evolution of mobile populations over time with demographic granularity	Irregular migrant population in Belgium (with age groups and gender breakdowns)

Estimating the Irregular Migrant Population Through Social Media Surveys	Tjaden and Rodríguez-Sánchez	Uses targeted Facebook advertisements to recruit migrants for online surveys, comparing direct questions and list experiments to elicit legal status	International migrants distinguishable by legal status, with focus on irregular migrants	Facebook-recruited survey data from Mexican and Venezuelan migrants	Social media recruitment can effectively reach irregular migrants; list experiments yield less biased estimates than direct questioning. Extrapolation is limited.	Mexican and Venezuelan migrants in four U.S. states
Estimating Irregular Migrant Stocks Using Social Media Data and Machine Learning	Rodríguez-Sánchez and Tjaden	Combines official statistics on international migrant stock, global social media data (Facebook), and predictive analytics through machine learning algorithms	Migrants not appearing in official migrant stock data reported to the UN	Official statistics on international migrant stock, global Facebook data, machine learning algorithms	Size of migrant groups on Facebook correlates with real size of migrant group regardless of status. Triangulation of multiple data sources can provide evidence-based estimates in data-scarce contexts	40 largest destination countries (with composition by world regions of origin and destination)
Exploring the Use of Aggregate Air Passenger Data for Estimating Overstayer Inflows	Bernasconi and Recchi	Computes 'net air travel flows' as the difference between incoming and outgoing passengers, then subtracts regular flows to estimate overstayer inflows	Overstayers - individuals entering with valid visa but staying beyond authorized period	Aggregate air passenger data from Schengen Area airports, net migration figures from QuantMig project and Eurostat data	Commercial flights are the most likely transportation mode to Europe for non-European travellers; overstaying is main gateway to irregular migration	Non-European countries as origins, Schengen Area as destination, disaggregated by region of origin for 2019

Note: Author's own elaboration.

A common definition of irregular migration proves difficult to establish, as the availability and nature of data vary widely. As a result, aligning all approaches to a single benchmark is challenging. For a comprehensive overview of irregular migration definitions, see Kraler & Ahrens (2023). Each pilot study adopts a working definition aligned with one or more dimensions outlined by Kraler & Ahrens (2023), but the definition is often restricted by the characteristics of available data.

The methods used across the pilot studies vary widely. They include exploiting policy changes, comparing different definitions and indicators of informal labour and migrant irregularity, applying traditional demographic techniques, and developing two new quantitative approaches. In terms of data, the pilots draw on both conventional and innovative sources. This demonstrates that progress in estimating irregular migration can come not only from the use of novel data but also from the creative application of new and existing methods or traditional sources. As a result of these methodological and data-related differences, the coverage of irregular migrant populations varies significantly across the studies.

The pilot studies have been conducted with the understanding that no single estimate will ever be the “correct” estimate. In the field of irregular migration, there is no “correct” baseline to compare estimates to. Instead, in the best-case scenario, we have access to multiple estimates obtained from different methodologies that could serve to attain a more proximate estimate (e.g., through triangulation). Therefore, irregular migration estimates are best assessed by cross validating several approaches and examining convergence in the results.

3. FEASIBILITY

We define what is feasibility and assess how our different pilot studies fare in these terms.

3.1 WHAT IS FEASIBILITY?

Feasibility determines whether a proposed method can be realistically implemented within existing constraints. When evaluating the feasibility of our pilots, several critical dimensions must be considered: data accessibility, resource requirements, legal and political acceptability, and ethical implications.

Data Accessibility

Data accessibility represents the most fundamental constraint. While our pilots incorporate both traditional and innovative data sources, the latter often present significant challenges. Innovative data sources may be difficult to access due to proprietary restrictions, high acquisition costs, or limited availability (e.g., incompatibility with definitions in traditional data). This creates a bottleneck that can determine the viability of entire methodological approaches.

Resource Requirements

Implementation feasibility depends heavily on available resources across multiple domains. Technical expertise requirements vary significantly depending on the complexity of the chosen methods. Infrastructure needs must be assessed against existing capabilities, considering both computational resources and institutional capacity. The complexity of implementation itself becomes a feasibility factor, as overly sophisticated approaches may exceed organizational capabilities regardless of their theoretical merit.

Legal and Political Acceptability

A method's feasibility is also affected by the complex landscape of legal frameworks and political sensitivity in each country context. Government acceptance and stakeholder participation are essential for the successful application of methods to estimate irregular migration. Approaches that conflict with existing regulations or political priorities face significant barriers, regardless of their technical soundness.

Ethical Considerations

Ethical dimensions present perhaps the most complex feasibility challenges. Methods designed to estimate irregular migration carry inherent risks of exposing vulnerable populations to harm. The potential for individual identification creates serious ethical dilemmas that can render otherwise feasible approaches inappropriate for implementation. A method that can be performed in terms of data, technical expertise, and resources may not be feasible if is deemed too unethical as it puts migrants at risk.

These considerations require careful balance between analytical objectives and the protection of at-risk populations.

3.2 THE FEASIBILITY OF OUR PILOT STUDIES

With one exception, we consider all our pilot studies to be feasible for producing estimates of irregular migrant stocks. These include the studies by Salihoğlu & Vargas Silva (2025), Surkyn & Bircan (2025), Tjaden & Rodríguez Sánchez (2025), Rodríguez Sánchez & Tjaden (2025a), and Rodríguez Sánchez & Tjaden (2025b). One pilot—Bernasconi & Recchi (2025)—focuses on irregular migration flows rather than stocks. See Table 1 above for an overview and hyperlinks to all studies.

Table 2 Feasibility rating of MIrreM pilot studies

Pilot Title	Rating	Explanation
Estimating Undocumented Migration in the UK Using an Exclusionary Health Care Policy Reform	Low	The approach requires detailed patient-level information that is not publicly available. Even aggregated data is not publicly available in most countries. Use of individual level data would require stringent ethical assessment.
Measuring the Participation of Irregular Migrants in the Informal Economy	Medium	The approach is feasible in any country that conducts a Labour Force Survey with information on residence status, employer information, social and public service utilization, as well as employment and occupational status. Labour Force Surveys are usually made available to researchers for free.
Irregular Migration: What can Mortality Reveal?	High	The approach is based on well proven demographic concepts and feasible, in principle, in any country that has a mortality register. Researchers can use the data for free.
Estimating the Irregular Migrant Population Through Social Media Surveys	Medium	The approach requires few resources and can attain samples quickly. However, implementation depends on the social media platform which may block or remove recruitment ads or delete entire projects from its platform (without justification or appeal)
Estimating Irregular Migrant Stocks Using Social Media Data and Machine Learning	Medium	The approach relies on global social media data and availability of broad coverage of factors shaping migration and irregular migration worldwide. The data is currently available for free. Access to social media data may be restricted by companies at any time or key variables (previous residence) not be removed at will.

Exploring the Use of Aggregate Air Passenger Data for Estimating Overstayer Inflows	Medium	The approach relies on proprietary data sold by private companies. The cost is high and can change at any time. In principle, however, the data is available globally.

The feasibility of producing these estimates depends heavily on data availability, which varies across studies. For example, Bernasconi & Recchi (2025) rely on data from Sabre, a private company that collects detailed flight passenger information. While this dataset is prohibitively expensive for most researchers, government agencies may be able to access it.

Similarly, Rodríguez Sánchez & Tjaden (2025b) use data obtained from Facebook's API, which can be retrieved through automated requests. However, both Sabre and Facebook are private companies that operate with opaque, proprietary algorithms. These "black box" processes are not transparent to researchers and may change at any time, potentially affecting data reliability and long-term feasibility.

The digital survey conducted by Tjaden & Rodríguez Sánchez (2025) via Facebook illustrates both the potential and limitations of these new methods. While it offers a cost-effective alternative to traditional offline surveys, its success depends on how Facebook and Instagram target advertisements—another process governed by internal, ever-changing algorithms. These dependencies on private, dynamic systems introduce uncertainty into the reproducibility and consistency of findings. Platforms may also block ads or entire projects if algorithms flag them as in violation of platform guidelines.

In contrast, the studies by Surkyn & Bircan (2025) and Salihoğlu & Vargas Silva (2025) rely on more stable data sources—namely, population registers and labour force surveys. These official statistical operations are less likely to undergo abrupt changes and carry greater legitimacy. Additionally, any modifications to these datasets are typically communicated transparently to the research community, enhancing their reliability.

From an ethical standpoint, the studies by Bernasconi & Recchi (2025), Rodríguez Sánchez & Tjaden (2025a), and Rodríguez Sánchez & Tjaden (2025b) pose minimal risk to migrants. The reason for that is that these methods rely on aggregated data and avoid collecting personally identifiable information. In the case of Salihoğlu & Vargas Silva (2025), the data is derived from anonymized random surveys. Surkyn & Bircan (2025) use data on deceased individuals, which is not subject to the same legal restrictions, though there is a potential—albeit limited—risk of identifying relatives of deceased migrants who may also be in an irregular situation.

In contrast, Tjaden & Rodríguez Sánchez (2025) faced significant ethical challenges due to the collection of highly detailed, individual-level information from social media users. In the current climate of heightened migrant persecution in the United States, such methods are

increasingly difficult to implement—not only because of ethical concerns, but also due to a lack of trust among potential respondents. Although the authors succeeded in producing estimates, the study encountered numerous complications during its implementation.

The one exception we mention above is the UK healthcare pilot (Rodríguez-Sánchez & Tjaden, 2025a). We found this approach unfeasible, as it would require access to highly sensitive individual-level health records to generate meaningful estimates. Although Rodríguez Sánchez & Tjaden (2025a) demonstrated that NHS reforms influenced the health-seeking behaviour in immigrant-dense areas, they were unable to link these behavioural changes to specific immigration patterns. While NHS records may contain cases involving individuals without legal documentation, this type of analysis raises significant ethical concerns. Access to NHS data is strictly regulated, requiring extensive ethical approvals due to its sensitive nature.

To our knowledge, aside from the ethical constraints posed by certain data sources and methods—which could imply risks for irregular migrant respondents—there are no major legal or political barriers to producing these estimates with the approaches we deemed to be feasible. Therefore, despite some limitations, we believe that generating robust estimates of irregular migration is feasible.

4. SCALABILITY

We propose a definition of scalability of approaches and assess how our different pilot studies fare in these terms.

4.1 WHAT IS SCALABILITY?

Scalability examines whether a given approach can be effectively applied across different geographical contexts and time periods while maintaining its analytical value.

Geographic and Temporal Transferability

A critical scalability constraint involves data dependency across contexts. Methods that rely on highly specific data sources may face limitations when applied to different countries or regions where such data are unavailable. Similarly, approaches developed for specific time points or periods may not translate effectively to other time periods due to changing circumstances, such as data availability, regulatory environments, or highly specific migration patterns.

Automation and Reproducibility

Moreover, scalability depends on whether methods can be systematized for repeated application. Methods that can be automated to generate updated estimates with minimal human intervention demonstrate superior scalability potential, enabling more efficient resource allocation and consistent results across applications. However, approaches that require extensive individual input and adaptability to be implemented or highly specialized expertise for each implementation face inherent scaling limitations.

Cost-Effectiveness at Scale

The economic dimension of scalability requires careful evaluation of cost trajectories as scope expands. Some methods may exhibit prohibitive cost escalation when applied to larger geographical areas, extended time periods, or increased numbers of country-of-origin groups (or other demographic subgroups for that matter). When implementation costs grow disproportionately relative to analytical benefits, approaches become economically unsustainable despite their technical merit. Cost-efficiency at scale therefore represents a fundamental constraint on method selection and implementation strategy.

4.2 THE SCALABILITY OF OUR PILOT STUDIES

Overall, the scalability of the different pilot studies is generally high. Provided that access to the necessary data sources can be secured, many of the approaches can be scaled over time

and even automated. This would allow for the repeated production of estimates both in the future and, where possible, retrospectively. This is particularly true for the methodologies developed in Bernasconi & Recchi (2025), Surkyn & Bircan (2025), Salihoğlu & Vargas Silva (2025), Tjaden & Rodríguez Sánchez (2025), and Rodríguez Sánchez & Tjaden (2025b).

Table 3 Scalability of MIrreM pilot studies

Pilot Title	Rating	Explanation
Estimating Undocumented Migration in the UK Using an Exclusionary Health Care Policy Reform	Low	The approach only works in countries which implemented specific health care reforms affecting health care utilization of irregular migrants.
Measuring the Participation of Irregular Migrants in the Informal Economy	Medium	The approach works, in principle, in any country with a Labour Force Survey. However, in countries where official population registers are used, the LFS sampling frame might not include any irregular migrants.
Irregular Migration: What can Mortality Reveal?	Medium	The approach works, in principle, in any country with a mortality register. Fewer countries have mortality registers than labour force surveys.
Estimating the Irregular Migrant Population Through Social Media Surveys	High	The approach can be scaled to any country with sizable migrant populations who use a social media platform. The platform must allow researchers to target advertisements at migrant communities specifically. In the year 2025, scalability using Facebook is high.
Estimating Irregular Migrant Stocks Using Social Media Data and Machine Learning	High	The approach works for countries with international stock data and Facebook data. The pilot study was able to produce estimates for countries which have never had an estimate before.
Exploring the Use of Aggregate Air Passenger Data for Estimating Overstayer Inflows	High	Conditional on obtaining proprietary data at high cost, the approach is scalable to most countries which have information on legal migrant populations and, ideally, emigration flows.

In contrast, the approach proposed by Rodríguez Sánchez & Tjaden (2025a), which leverages healthcare reforms affecting the NHS which occurred once in time, is less replicable due to the singular nature of the reform and the uniqueness of the UK's statistical system. In fact, this pilot was ultimately found to be unfeasible. However, similar reforms restricting health care access for irregular migrants have been implemented in other countries (e.g., most recently in France; see other examples in Bonneau, 2023). It is worth exploring in future research whether these reforms are suitable to the approach presented in this pilot study.

Scalability to other regions and contexts is also plausible for many of our pilot studies, though it requires a more careful consideration of different factors. The studies with the greatest potential for cross-country scalability are those by Surkyn & Bircan (2025), Salihoğlu & Vargas Silva (2025), and Rodríguez Sánchez & Tjaden (2025b), the latter of which already provides estimates for a broad range of countries.

The availability of mortality data in many countries makes the approach of Surkyn & Bircan (2025) especially promising, though its effectiveness depends on the existence of high-quality population register systems to enable a high-quality linkage of deceased individuals. Moreover, this method works in principle much better for older populations where mortality is higher, for younger population with far lower mortality rates and hence higher uncertainty in its estimation, strong fluctuations in small counts can make the estimates highly unstable.

Labour force surveys are available in many countries, which supports the scalability of Salihoğlu & Vargas Silva (2025)'s approach. However, challenges arise around the definition of the informal economy, which may not be universally applicable and can vary substantially across countries. Moreover, the assumptions used in this pilot study to identify likely irregular migrants may not hold in other contexts, even though the approach has been tested in both the UK and Türkiye. Varying legislations regarding irregular work require expert knowledge in each country.

Bernasconi & Recchi's (2025) approach is also potentially scalable, as air passenger flow data is globally available. However, the key limitation lies in the scarcity of reliable immigration and emigration statistics in many countries, which are necessary for validating net flows. Moreover, the presence and importance of land borders, where for some countries might be how most of migration takes place, is a further important limitation when thinking about other contexts.

The digital survey methodology used in Tjaden & Rodríguez Sánchez (2025) can, in principle, be replicated in different settings. Its feasibility depends on the extent to which migrants in each country use platforms like Facebook. In countries where digital surveys are not viable, the core technique—list experiments—could still be applied via alternative survey modes, assuming that large enough samples of potentially irregular migrants can be reached.

As mentioned earlier, digital surveys are among the most cost-effective data collection methods. In contrast, data from sources like Sabre are prohibitively expensive. Other sources, such as labour force data or Facebook API data, may be available for free, but extracting and analysing them requires substantial technical expertise.

5. VALIDITY

We present a framework for evaluating the validity of methodological approaches and examine how our pilot studies perform against these criteria.

5.1 WHAT IS VALIDITY?

Validity assesses whether a method accurately measures what it claims to measure. In our case, whether approaches genuinely capture irregular migration stocks or flows, as defined within our framework. It is worth noting that definitions of irregular migration stocks or flows may differ across the pilots, as highlighted in section 2.2 above, hence our pilot studies might be estimating different aspects of the more encompassing definition of irregular migration (Kraler & Ahrens, 2023).

Conceptual Validity

Conceptual validity examines the alignment between theoretical constructs and the empirical operationalization that was carried out. It asks whether our definition of irregular migration is adequately reflected in the data sources and analytical processes employed. This dimension ensures that the conceptual framework guiding each approach corresponds meaningfully to the empirical indicators being utilized in each case.

Empirical Validity

Empirical validity concerns the proximity of our estimates to "true", although unknown values. Given the absence of definitive benchmarks in irregular migration measurement, the primary method for assessing empirical validity involves comparative analysis against other established estimates and methodological approaches.

Internal Validity

Internal validity evaluates the logical coherence and methodological rigor of our approaches. This assessment examines underlying assumptions, analytical processes, and the logical pathway from data inputs to final estimates. Strong internal validity requires that methods demonstrate sound reasoning and appropriate treatment of potential confounding factors.

External Validity

External validity addresses the generalizability of results beyond the specific contexts in which estimates were developed. Unlike scalability, which focuses on operational transferability, external validity examines whether the fundamental relationship between our methods and the phenomenon they measure remains consistent across different populations, contexts, and time periods.

5.2 THE VALIDTY OF OUR PILOT STUDIES

Validity represents the most challenging criterion to evaluate in our pilot studies. The fundamental obstacle lies in the absence of a reference standard or "gold standard" for irregular migration measurement. This lack of definitive benchmarks for both stocks and flows creates inherent limitations in our ability to establish empirical validity definitively.

One practical approach to examining the overall validity of each approach is to assess their main assumptions and rate how problematic or realistic they might be.

Table 4 Validity of MIrreM pilot studies and their assumptions

Pilot Title	Rating	Explanation
Estimating Undocumented Migration in the UK Using an Exclusionary Health Care Policy Reform	Low	The results from the pilot how low validity because individual level data on migrant status and internal, cross-district movements were not accessible.
Measuring the Participation of Irregular Migrants in the Informal Economy	Medium	A key problem of this approach is that it assumes that irregular migrants are included in the sampling frame of labour force surveys and, moreover, that, if they are included, that they accept to participate in such surveys and, if they do participate, that they provide truthful answers to surveys. This approach might be valid in cases where irregular migrants are likely to be included in the LFS.
Irregular Migration: What can Mortality Reveal?	High	Validity of the approach is high because it does not rely on sample surveys, and it thus not subject to sampling or response bias. It relies on full enumeration registers. It is possible that certain deaths are not recorded in the hospital. One problematic assumption is that irregular migrants follow similar mortality trends than regular migrants and that migration stock data account for the fact that many migrants return home before they die.
Estimating the Irregular Migrant Population Through Social Media Surveys	Medium	The results of the pilot studies are plausible relative to alternative estimates. However, there are many problematic assumptions limiting validity: The Facebook measure of previous residence has been shown to be inaccurate and likely does not capture only (or all) international migrants. Participation in social media overall changes rapidly and not all populations participate. Irregular migrants may be less likely to be on social media and are less likely to provide truthful answers (even in anonymized surveys).
Estimating Irregular Migrant Stocks Using Social Media Data and Machine Learning	Medium	The main assumption is that irregular migrants participate in social media and that coverage is high. Moreover, the use of official statistics on migrants, sometimes based on projections, assumes that these tend to under-estimate the real unobserved number of migrants in a country.

Exploring the Use of Aggregate Air Passenger Data for Estimating Overstayer Inflows	Medium	The main assumption here is that arrivals who do not leave the Schengen area are potential overstayers (if they are not permanent residents, students, workers, asylum seekers etc.). Arrivals could depart from the Schengen area by land. The approach is difficult to apply to individual countries due to land travel.

The most important and most difficult to assess category of validity is empirical validity, i.e. how consistent the estimates are with accepted benchmarks. In essence, validity requires demonstrating a correspondence between our measurement objectives and the actual empirical outcomes—an especially challenging task in the field of irregular migration research. Rodríguez Sánchez & Tjaden (2025b) assessed the validity of their estimates by comparing them with existing estimates in just over twenty countries, where benchmark data were available. Their analysis revealed varying degrees of overlap; however, in a significant number of cases, their estimates aligned closely with existing figures, consistently overlapping. This provides some indication that their approach can yield estimates broadly comparable to those already in use.

For the other pilot studies, no comprehensive cross-country comparison was feasible. Nevertheless, the range of estimates produced by Salihoğlu & Vargas Silva (2025) includes values consistent with those reported in previous research (Jolly, Thomas, & Stanyer, 2020). Similarly, Tjaden & Rodríguez Sánchez (2025) compared their findings with estimates derived from the residual method, employing the American Community Survey and found overall high levels of agreement, especially for the case of Venezuelans in the four states in the US that were studied. For Mexicans in those states, estimates from their list experiment were higher.

6. CONCLUSION

As a way of conclusion, we present the lessons learned in developing and implementing the series of pilot studies and assessing their feasibility, scalability and validity

In this working paper, we have presented an assessment of the feasibility, scalability, and validity of the pilot studies developed within the MIrreM project. We began with a brief overview of the main idea behind each study, their data sources, main assumptions, and coverage, followed by a detailed discussion of the three core assessment criteria, along with a description of each key dimension relevant to the concepts we assessed.

6.1 RISKS AND CHALLENGES

For the pilot studies that have demonstrated feasibility and scalability, future research should aim to replicate these findings across different country contexts and with more recent or alternative data sources. This replication should consider the various points highlighted in this working paper regarding scalability across time and geographical contexts and especially whether the data sources on which the pilot studies are based is comparable.

In our assessment, we emphasized that validity remains the most elusive aspect. Importantly, convergence between estimates produced by distinct methodologies serves as a key source of confidence in both the methods and the resulting figures, even in the absence of a reference standard estimate produced by a feasible, scalable and valid methodology (e.g., the residual or the multiplier methods as reviewed in Rodríguez Sánchez & Tjaden, 2023). The greater the alignment among independent estimates, the stronger the case for their reliability in capturing the underlying—though inherently unobservable—phenomena of irregular migration, whether measured as stocks or flows.

Taken together, these insights underscore the value of methodological triangulation and iterative testing in advancing robust, evidence-based approaches to understanding irregular migration.

6.2 LESSONS LEARNED

Overall, our impression is that, despite certain limitations and challenges, these pilot studies represent a meaningful advancement in the study of irregular migration and the production of estimates of stocks and flows. Many of the pilot studies demonstrated feasibility and scalability. While validity remains a complex issue—particularly in the absence of a definitive

"gold standard"—we observed a degree of convergence between some of the estimates produced by our innovative methodologies and those found in existing studies. Additionally, there was a notable level of internal consistency across the estimates generated by the different pilot studies.

Given the lack of, the best possible approach is likely a combination of different methodologies that can provide complementary information on the size of the irregular migrant population, both in terms of flows (i.e., arrivals and overstayers) and stocks. We would like to encourage further development of these pilot studies for further testing and empirical validation.

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ABOUT THE AUTHORS

Alejandra Rodríguez Sánchez is a postdoc at the University of Potsdam, Germany.

Jasper Tjaden is Professor for Applied Social Research & Public Policy at the University of Potsdam, Germany.

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