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International Migration and City Growth in the Global South: An Analysis of IPUMS Data for Seven Countries, 1992–2013

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Evidence on the demographic components of city growth in the global South is scarce, and the role played by international migration is neglected. We analyze the importance of recent international migration in cities, compare it with that of internal movements, and evaluate the growth contribution across national contexts and the urban hierarchy. Combining individual-level census data and geographic master files of metropolitan areas with indirect demographic estimation techniques, we cover 377 cities in seven countries. It is found that, in almost one third of cities, population change and replacement has been mainly determined by migration. The international component was larger than the internal one in more than half of cities. Whereas internal migration tends to decrease with rising city size, international movements tend to increase. Positive net international migration substitutes for the net losses from domestic movements in large cities, but complements the gains in intermediate-sized cities.

Introduction

The urban transition, from a mainly rural to a predominantly urban society, constitutes one of the most important transformations in contemporary population geography. In 2015, 49 percent of the population in developing countries was living in urban areas (up from 35 percent in 1990), and future world population growth is expected to be concentrated there (United Nations 2018). This agglomeration of human activity is accompanied by new opportunities for human development through efficient delivery of social services, educational expansion, cultural diversification, and economic

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growth (Bloom, Canning, and Fink, 2008). At the same time, major challenges arise, due to growing slum settlements, strains on educational and health services, the limited capacity of the labor market to absorb the population growth, environmental degradation and climate change (UN-Habitat 2012; Rohat et al. 2019). Despite these risks and opportunities of the urban transition, the demographic changes remain poorly documented, especially at the city level where planning can be implemented most effectively. We aim to fill this gap, focusing on the underappreciated role of international migration in comparison with the other components of city growth.

Repeated assessments of the demographic components of urban growth since 1960 in developing countries have suggested a dominant role for the excess number of births over deaths (i.e., natural increase), rather than for within-country rural-to-urban migrations (Chen, Valente, and Zlontnik 1998; United Nations 1980; Jedwab, Christiaensen, and Gindelsky 2017; Jiang and O'Neill 2018). This natural growth pattern can be explained by the onset of the demographic transition—as manifested by declining mortality since the 1960s—and the large population base in urban areas (Dyson 2011). However, urban societies in the developing countries have completed their fertility transition (Lerch 2019a). The importance of migration will thus rise in the future, as the majority of the population is concentrated in the working ages at which the propensity to migrate is highest. In the very low urban fertility contexts of China and South-East Asia, recent urban growth has mainly been driven by net rural-to-urban movements (Hugo 2014; Zheng and Yang 2016).

However, a country's geography of population mobility changes over the course of the processes of urbanization and development (Geyer and Kontuly 1993; Champion 2001; Zelinsky 1971). In the initial stage, the large-scale rural exodus focuses on a limited number of fast-growing cities which dominate the economic geography. Over time, the excessive agglomeration of human activity creates industrial diseconomies, as well as social and environmental congestion effects. These problems particularly concern cities at the top of the settlement distribution according to population size, political and economic functions—hereafter also referred to as the urban hierarchy. As a result, economic activities are shifted to lower-ranked settlements. As people follow the delocalization of jobs and look for environmental amenities, rising intercity migration redistributes population from primate cities, which lose migrants, towards the fast growing intermediate-sized and, eventually, smaller cities, which gain from internal migration. Rural-to-urban movements may increasingly focus on lower-ranked settlements as well. This transformation of the geography of internal migration has been under way in Latin America since the 1980s (Rodríguez-Vignoli 2017) and is emerging in Asia (Jones 2006; Firman 2016). What is more, the overall intensity of internal migration has been

declining across the world since the 1980s (Bell et al. 2018). Research has not yet established whether this is related to the urbanization and aging of the population (implying a shrinking potential for rural exodus), or to other factors.

While the role of internal migration in city growth is diversifying and potentially declining, we know almost nothing about international movements. International migration has concerned a growing number of developing countries and has increasingly taken place between them, since 1960—from less- to more-urbanized countries (Czaika and de Haas 2014; Özden and Parsons 2015; Abel and Sander 2014). Yet evidence about the subnational origins and destinations of these flows is almost completely nonexistent in the global South.

Cities are likely to play a key role in the international migration phenomenon (Skeldon 2018). They are attractive destinations because of their more diversified labor markets, when compared to rural areas, and their role as engines of national economic and social development (World Bank 2009). Cities compete with one another for students, and for low and highly skilled workers on a national *and* global scale. These pull factors of migration are particularly marked in global cities that function as command centers of the international economy (Sassen 2001). Cities thus constitute national gateways for immigrants because they concentrate networks of previous migrants who assist new candidates in their resettlement process. In 2005, 20 cities across the globe counted more than one million foreign-born residents—or one fifth of the world's migrant stock (Price and Benton-Short 2007). The importance of international migration for demographic growth is confirmed in a sample of large cities and national capitals around the world—not only in Western countries, but also in Eastern and South-Eastern Asia (Hugo 2014; Plane, Henrie, and Perry 2005; Strozza et al. 2015; Lerch 2017). However, we lack evidence for a truly international sample of cities that also includes intermediate-sized and small settlements, where the majority of the world's urban population is concentrated (United Nations 2018).

Cities may be major sending areas of international migrants, too. The capabilities to move abroad are often acquired in urban environments because they concentrate the higher education infrastructure. When compared to lower-skilled workers, the more educated face lower barriers to mobility (in terms of costs, language proficiency, etc.), have access to a more global labor market, and increased aspirations for and awareness of better political and economic opportunities abroad (DeHaas 2010). Cities also act as career escalator regions (Fielding 1993), in which workers gain experience in modern labor markets and develop work attitudes that enable them to find desirable jobs in other countries. As the major nodes in transport and communication networks, cities also tend to channel the rural exodus towards foreign destinations (Fussel 2004, Lerch 2016). In addition to these

enabling factors of migration, push factors may also be significant in cities. This may especially apply to small ones where income poverty, limited basic infrastructure, and adverse health conditions are more prevalent when compared to larger cities (Brockerhoff and Brennan 1998; Ferré, Ferreira, and Lanjouw 2010).

In sum, net international migration in cities depends on the balance between the push, enabling and pull factors of migration. According to the hypothesis of a mobility transition (Zelinsky 1971; Skeldon 1990), there are patterned regularities in migration dynamics over the development process. Cities are expected to constitute major migrant sending areas in early stages of the international migration phenomenon, when push and enabling factors outweigh the pull factors. As observed recently in Dakar (Senegal) and Albanian cities (Willekens, Zinn, and Leuchter 2017; Lerch 2016), this either offsets the cities' gains or exacerbates the losses from internal migration. In more advanced stages of the international migration phenomenon, when the opportunities to move abroad have diffused into peripheral areas and the domestic economy has developed, cities become major destinations of immigrants. International flows may then either complement the cities' positive internal migration balance, or substitute for their losses. In the worst case, countries are trapped between these two stages, in the so-called second urban transition (Skeldon 2008). This is characterized not only by urban emigration, but also by the rural migrants' bypassing of domestic cities located on their route abroad. Here, the domestic labor force potential for development in cities is foregone. However, our understanding of these interactions between the two types of migration remains fragmentary. We do not know in which city context international migration complements or substitutes for the losses, or offsets the gains from net internal migration.

In this article, we provide the most comprehensive assessment of the role of international migration in the process of city growth across various demographic and urbanization contexts. We take into account differences across seven developing countries and their urban hierarchies in 1992–2013. From the above review of the literature, we derive three main hypotheses. First, we expect a negative international migration balance in cities in early stages of the mobility transition, but positive net flows in later stages. In other words, cities should lead the progress in their country's mobility transition. Second, we hypothesize that international migration contributes to city growth to a larger extent than internal migration (and natural increase) in later, when compared to earlier, stages of the urban (and demographic) transition. This can be related to the exhaustion of the domestic rural reservoir of potential internal migrants (and the cities' leading role in the secular fertility decline). Third, we expect international migration to be positive and more sustained in upper levels of the urban hierarchy, where social and economic attractiveness should dominate over

the push and enabling factors of migration. As the enabling and push factors may predominate, respectively, in intermediate-sized and small cities, these are expected to lose populations to other countries. In other words, international immigration may compensate for the declining (if not negative) internal migration balance and natural increase in large cities. In smaller cities, by contrast, international emigration may at least partly offset the higher gains from these other growth components.

In the next section, we introduce the seven countries in which we study the components of population change. We then present the data and outline how we rigorously address three main challenges in the analysis of city demography: the lack of demographic statistics, the definition of the cities' spatial delimitation, and its extension over time. Applying two complementary approaches of indirect estimation to quantify the uncertainty of the results, we cover 377 metropolitan populations that are consistently defined over time and across space based on comparable spatial data and methodology. The importance of international migration in cities is evaluated by comparison with the corresponding national-level estimates of international movements and the cities' level of internal migration and natural increase. Finally, we discuss the relevance of the results for our understanding of the international migration phenomenon and the process of city growth in the global South.

Country contexts

We focus on city growth in seven countries spanning all regions of the global South and different stages of the demographic and mobility transition. Relying on statistics by quinquennium from the United Nations (United Nations 2018, 2017) (if not stated otherwise), we introduce here the seven national contexts in the periods in which our data enable the analysis of city demography.

Benin is characterized by the highest crude birth rate (4.1 percent) in our period of observation 2002–2013, and is the poorest and least urbanized country in the sample (with 41 percent of inhabitants living in cities). International emigration has been moderate, with 6 percent of its population living abroad in 2000 (Özden et al. 2011). *Morocco* is the second-least developed country in the sample, having reached an intermediary stage in the urban transition and is about to complete its demographic transition at the time of observation in 1994–2004 (53 percent of the population was living in cities, and the crude birth rate was 2.2 percent). We observe this country, after 40 years of unabated emigration to Europe (DeHaas 2007), which culminated in 11 percent of its population living abroad. A progressive increase in permanent and transit inflows from sub-Saharan Africa led to a historical rise of annual net migration above the -0.2 percent threshold in 2010–2014 (UN 2017).

The middle income countries of the *Philippines* and *Indonesia* have also reached intermediary stages in the urban transition and approached the end of their demographic transition in the period of observation 2000–2010 (with urbanization levels of 46 percent and crude birth rates below 2.7 percent). Both countries experienced large-scale temporary emigration of contract workers since the 1960s (with 7 percent of the Philippine and 2 percent of the Indonesian populations residing abroad in 2000). The unabated trend is particularly surprising in the Philippines, where the economy has grown substantially in recent decades (Asis 2017). We observe the two countries in the period that immediately precedes the first decline in the outflow after 20 years in the Philippines (United Nations 2017), and that coincides with the onset of a more sustained and permanent emigration from Indonesia (Hugo 2007; Aris and Arifin 2014).

Chile, Brazil, and Mexico are among the most urbanized countries in the world (i.e., at least 75 percent of the population living in cities). They have (almost) completed their demographic transition (with a crude birth rate of 1.7–2.2 percent) and count among the most developed countries in the global South. While Mexico has experienced large-scale emigration to the United States since the 1950s, the other two countries are emerging destinations for migrants from South America (Cerrutti and Parrado 2015). During our period of observation in Mexico (2000–2010), return migration from the United States as well as immigration or transit migration from South America was on the rise, leading to a near-zero migration balance (Alba 2013). In Chile, we focus on the period 1992–2002, which was characterized by a complete turnaround in migration patterns—from a negative balance during the Pinochet era to a positive one during the subsequent democratization and economic revival. Immigration originates from neighboring countries and has increased strongly since the mid-1990s (Dona-Recevo and Levinson 2012). Our observation window in Brazil (2000–2010) coincides with the ratification of the Mercosur Residency Agreement in 2002, which significantly drove immigration from neighboring countries (Wejsa and Lesser 2018).

This short overview of the selected countries (see the online Appendix A1, especially Table A1.1, for more details) reveals a coherent ranking in terms of the urban and demographic transition and socioeconomic development (with Benin being in an early stage, followed by Indonesia, the Philippines and Morocco in mid- to advanced phases, and finally the Latin American countries, which have reached final stages). The sample is thus appropriate to investigate the associations between these aggregate processes of social change and the demographic growth patterns of cities. Although the countries have attained different stages in the international migration phenomenon, we observe them all in periods of major transformations. While the dominant emigration flows from Indonesia are more and more constituted by permanent (rather than temporary) moves, Chile

is in the midst of a major shift from a migrant-sending to a net receiving country; Brazil also emerges as a major country of immigration from within the region. Mexico and, possibly also the Philippines and Morocco, by contrast, are on the eve of this migration turnaround. So we analyze whether the cities reveal distinctive migration regimes, when compared to the situation at the national level, and whether the distinctiveness differs according to the stage attained in the international migration phenomenon.

Data and methods

We analyzed the components of recent city growth between two subsequent censuses, distinguishing the contribution of natural increase from that of net internal and net international migration (hereafter also referred to as net out-/in-migration and e-/immigration, respectively). This was enabled by a combination of indirect demographic estimation techniques with the use of individual-level census data and geographic master files of the cities' metropolitan areas.

Data and definitions

The first challenge in the analysis of city demography is related to the scarcity of official population statistics disaggregated at the city level. We assembled Integrated Public Use Micro-Samples (IPUMS) of national population censuses fielded since 1990; these include information on the place of residence at the time of enumeration and five years earlier, disaggregated by municipality or any other detailed subnational administrative level (Minnesota Population Center 2017). These microlevel data enable us to aggregate individuals into meaningful and consistently defined cities in order to estimate: weighted population counts and intercensus growth, as well as out- and in-migration flows. Death rates are taken from the United Nations, while international migration and natural increase between two censuses are indirectly estimated (see below).

We rely on internal migration transition data, comparing individuals' places of residence at the time of enumeration with those five years earlier or at the time of the last move within this period. We may thus miss circular and stepwise movements, which would lead to a slight underestimation of internal migration. Due to data limitations (see online Appendix A1), we have to assume that this rate of internal migration for the last quinquennium of the intercensal interval remained constant over the whole interval.

The second challenge in the estimation of the components of city growth refers to the spatial extent of cities. Administrative definitions are based on political criteria (i.e., the city proper), which exclude the more recently urbanized outlying areas. In order to appropriately delimit the city

areas from the countryside, we used a statistical definition of metropolitan areas. These consist of a group of adjacent and functionally integrated settlements: at least one city proper and additional localities with which it spatially interacts (Plane 2004). Consequently, metropolitan areas (hereafter also referred to as cities) include the recently urbanized (but officially rural) areas in the vicinities of the city proper. We rely on the metropolitan areas as defined by the Mexican and Brazilian statistical offices, and by Thomas Brinkoff from the University of Oldenburg for the remaining countries. The lists of municipalities constituting each *metropolitan area* are assembled on Brinkoff's website www.citypopulation.de. Although the definitions of metropolitan areas are not strictly identical across countries, they are comparable as they rely on similar types of geospatial census data (e.g., population density, the continuity of the built environment, commuting flows between localities, etc.) and similar spatial analysis methods. To regroup the IPUMS populations by metropolitan areas, we matched the www.citypopulation.de lists of municipality names for each metropolitan area to the IPUMS spatial information about the individuals' current and former places of residence. The focus on the metropolitan area enables us to observe the whole city population and its demographic dynamics, which differ significantly from that of the population contained in the city proper (see online Appendix A1).

In Benin, Morocco, and Indonesia, the IPUMS geographical information is not available at the detailed municipality level. Here, we defined the metropolitan areas by identifying the constituent second-level administrative units (districts/regencies) with a high population density according to www.citypopulation.de. We checked the spatial extent of all metropolitan areas according to the IPUMS geographic shapefiles against satellite images (using Google Maps). We also excluded from the metropolitan areas all municipalities (districts) with more than 30 percent of the economically active occupied population (aged 15 to 64) in the agricultural sector.

The third challenge in the analysis of city demography relates to the extension of the city borders over time as the population sprawls into adjacent rural areas (Bloom et al. 2010; Montgomery et al. 2003). This rural-to-urban reclassification of municipalities is seldom documented—even though its contribution to urban growth rises over the course of the urban transition (Jiang and O'Neill 2018) and confounds the indirect measurement of migration. As reclassification is generally driven by population increase (Bocquier and Costa 2015), we would like to account for those demographic components, too. Therefore, we define metropolitan areas according to the www.citypopulation.de list of constituting municipalities or districts at the *end* of the observation periods. This definition of the metropolitan areas is then also applied to population data in earlier years. This is made possible thanks to the IPUMS's spatial harmonization of subnational administrative units across census rounds. In other words, we

eliminate the reclassification component of city growth in order to focus on the demographic processes within constant spatial extents of cities. In Indonesia, only 31 cities could be defined based on the harmonized geographic information. For another 28 cities, we relied on the nonconsistent information, meaning that these estimates may (or may not) be confounded by reclassification. As the data do not allow us to consistently define over time the greater metropolitan area of Jakarta, we focus separately on the consistently defined Special Capital Region of Jakarta and its satellite cities, for which we use nonharmonized geographic information.

Among the countries that meet the data requirements for our indirect estimation of net international migration (e.g., the availability of detailed IPUMS information on the internal migrants' place of origin; see below), we selected seven countries with large populations. The aim was to span all developing regions and stages of the demographic and urban transitions. We cover 377 cities and focus on the most recent period for which data are available: 5 cities in Benin observed in the period 2002–2013, 128 Brazilian cities in 2000–2010, 26 cities in Chile in 1992–2002, 59 Indonesian cities in 2000–2010, 59 Mexican cities in 2000–2010, 6 Moroccan cities in 1994–2004 and 94 cities in the Philippines in 2000–2010. The sample includes settlements characterized by various functions, such as political or economic capitals, regional centers, border, mining, and touristic cities, with populations ranging between 50,000 and 21 million inhabitants (see Table A1.2 in the online Appendix A1; the population of smaller cities cannot be accurately estimated with census samples).

Method

We estimate the level of natural increase and net international migration for each distinct city, as well as its net internal migration with the remaining national territory, between two subsequent censuses. As we have concerns about the quality of the census samples, we applied two complementary estimation approaches to quantify the uncertainty of the results.

In the first approach, we estimated the components of demographic change at the aggregate population level, using the demographic balancing equation (or accounting) method. The rates of intercensal population change, in-migration to the city, and out-migration to the remaining national territory are directly estimated based on the weighted IPUMS data (see online-Appendix A1 for details). Crude death rates are computed as a weighted average of the United Nations' age- and sex-specific mortality rates, with the weights being the relevant city-specific population at risk as approximated by the average of two subsequent IPUMS counts (adjustments for lower mortality in cities had no effect on the results). In a first step of indirect estimation, we obtained intercensal crude birth rates by reverse-survival of the weighted numbers of children aged under 10 at the second

census (Moultrie et al. 2013). In a second step, we estimated the number of net international migrations as the *residual* of the demographic balancing equation at the aggregate population level (see online Appendix for more detail):

$$\begin{aligned} \text{Net international migration} &= \text{population growth} + \text{deaths} \\ &\quad - \text{births} - \text{net internal migration} \quad (1) \end{aligned}$$

The residual captures all the uncertainty regarding data quality. Indirect estimates of the crude birth rate and net international migration may be significantly affected by differential levels of enumeration completeness between the two censuses, or by the differential quality of the sampling of the IPUMS data from the full set of census records. Sampling quality may be particularly low for smaller cities and, more generally, for the census samples that have been drawn by the national statistical offices (rather than by IPUMS) without providing information on the methodology. We therefore compute lower- and higher confidence intervals of our indirect estimates by replicating the procedure outlined above, after adjustment of the population counts at the second census for a hypothetical rate of differential under- and overenumeration/sampling of three percent, respectively.

Censuses more frequently undercount children than older populations. Our estimate of natural increase may thus be particularly underestimated. The net international migration residual would then be overestimated. Alternatively, natural increase may be overestimated because it is derived from the age structure at the second census, which includes the internal and international immigrants (with often higher fertility) during the interval. In this case, international migration would be underestimated. In order to cross-validate the results based on the aggregate method of indirect estimation, we therefore applied a second method.

In the alternative approach, we turn things up-side down. The number of net international migrations is obtained as a first residual of the age-specific version of the demographic balancing equation (see Appendix; Hill 1987; Hill and Wong 2005):

$$\begin{aligned} \text{Net international migration} &= \text{population growth} + \text{deaths} \\ &\quad + \text{net transfers across age groups (due to population ageing)} \\ &\quad - \text{net internal migration} \quad (2) \end{aligned}$$

The main advantages of this method, when compared with the conventional cohort-survival method of estimating migration (Siegel and Swanson 2004), is that it directly provides estimates for age-groups (rather than age-cohorts), and that it is able to accommodate intercensal intervals that are

not exactly 10 years. The number of births is then obtained in a second step as the residual of the balancing equation at the aggregate population level.

As in the case of the first estimation procedure, we computed lower and higher confidence intervals, assuming, respectively, a three percent under- and overenumeration/sampling at the second census. Our validation tests in the online Appendix A1 confirm that the first (aggregate) and second (age-specific followed by aggregate) approach indeed imply different estimates of international migration. However, the major uncertainty in our estimates stems from the potential intercensal differentials in the levels of enumeration completeness or sampling quality. We thus average the point estimates and show the maximal confidence intervals across the two estimation procedures. Although our indirect estimates based on census data cover only permanent moves, they also include undocumented migrations which make up large parts of the flows in the period of observation.

Results

International migration and its interaction with internal movements in cities

Our first hypothesis was that cities pioneer emerging migration trends at the national level. To establish the importance of international movements for cities, we compare in Table 1 the country-specific average rate over all cities with the national-level estimates from the United Nations for corresponding periods (United Nations 2017). Our second hypothesis predicted that emigration will dominate in early stages of the urban transition, while immigration should out-weigh in advanced stages, when the country is economically more attractive. Therefore, we expected international movements to offset the cities' gains from internal migration in less urbanized countries, and to compensate for the more limited (if not negative) balance of domestic flows in more urbanized ones.

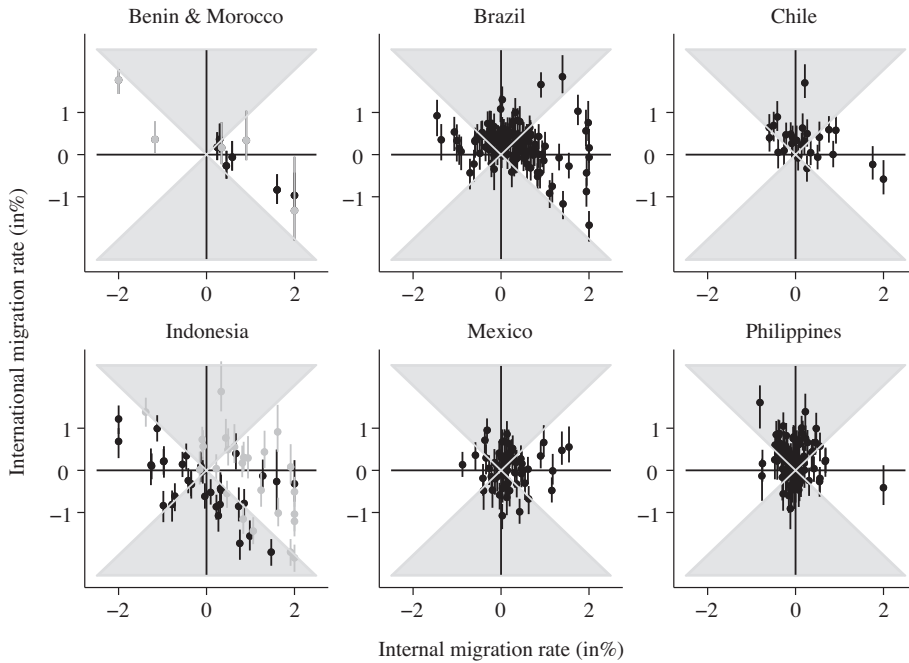
To compare the importance of the two types of movements, we plot in Figure 1 all cities according to the annual rate of net internal migration (on the horizontal axis) and the rate of net international migration (on the vertical axis) by country. The metropolitan populations situated in the upper gray-shaded triangle experienced a positive net international migration, which was larger than the absolute value of the balance of internal movements. In cities situated in the lower gray-shaded triangle, net international migration also affected city growth to a larger extent than internal migration, but the rate is negative. Outside of these gray-shaded areas, the internal movements had a major demographic impact. We also mapped the internal and international migration patterns to evaluate the plausibility of our results and better understand the spatial context of the interactions between the two flows (see online Appendix A2). Table 1 provides

TABLE 1 Population-weighted average rates of net internal and international migration in cities, as well as the distribution of cities by pattern of migration, 377 metropolitan areas in seven developing countries, 1992–2013

Country	Number of cities	Net internal migration rate (NMInt)	Net external migration rate (NMExt)	National net external migration rate (UN)	Cities in which NMExt dominates over NMInt *	Cities with positive external migration	Cities with positive NMExt and neg. NMInt	Cities with pos. NMExt and neg. NMInt	Cities with neg. NMExt and pos. NMInt	Cities with negative NMExt and NMInt	Total of cities
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
All	377	0.1	0.2 (-0.1 to 0.5)		52 (48–63)	68 (36–82)	38	30	22	10	100
Benin	5	0.2	0.0 (-0.4 to 0.7)	0.0	0 (0–40)	80 (40–80)	40	40	20	0	100
Brazil	128	0.1	0.3 (0–0.6)	0.0	44 (34–62)	77 (41–90)	47	30	20	4	100
Chile	26	0.0	0.4 (0–0.7)	0.0	58 (31–69)	81 (54–92)	42	38	19	0	100
Indonesia	59	0.2	-0.2 (-0.5 to 0.2)	-0.1	39 (39–51)	46 (25–56)	20	25	41	14	100
Mexico	59	0.1	0.1 (-0.3 to 0.4)	-0.3	59 (59–63)	63 (31–80)	47	15	25	12	100
Morocco	6	0.7	-0.2 (-0.5 to 0.2)	-0.4	17 (17–33)	33 (17–67)	33	0	67	0	100
Philippines	94	0.1	0.5 (0.2–0.8)	-0.3	71 (66–82)	71 (36–89)	30	41	11	18	100

NOTE: *With the absolute level of NMExt being larger than the absolute level of NMInt; figures in parentheses = confidence intervals; neg. = negative, pos. = positive; national net external migration rates are averages of the rates published by the United Nations (2017) for two successive quinquennia that correspond approximately to our country-specific periods of observation: 2000–2010 in Benin, the Philippines, Indonesia, Mexico and Brazil, 1995–2005 in Morocco and 1990–2000 in Chile.
SOURCE: Own estimates based on www.citypopulation.de and IPUMS-international.

FIGURE 1 Annual rates of net internal and international migration by city, 377 metropolitan areas in seven developing countries, 1992–2013



NOTES: In the panel for Benin & Morocco, black dots refer to Morocco and light gray dots to Benin; in the panel for Indonesia, light gray dots refer to cities defined by geographic areas that are not necessarily consistent over census rounds; the vertical lines that cross the dots refer to the confidence intervals of net international migration.

SOURCES: Own estimates based on www.citypopulation.de & IPUMS-International.

country-specific summary statistics. The country-specific average migration rates over cities are population weighted in order to standardize for the national differences in the city-size distribution (as the level of migration changes with city size; see below).

In the least urbanized country of the sample, Benin, the relative international migration balance of cities and of the country as a whole do not differ significantly (i.e., 0 percent; compare columns 4 and 5 of Table 1). Net emigration from all over Morocco (a midurbanized country) was more sustained than from cities (−0.4 percent vs. −0.2 percent), but the confidence interval overlaps. Two cities located on the migration route towards Europe (Tangier and Agadir/Inezgame Ait-Melloul; see the country map in the online Appendix A2) experienced more intense net emigration than the country as a whole, but this did not fully offset the huge in-migration flows. Cities located inland experienced a positive balance in both types of movements. The internal component by far dominated total net migration in all 11 cities of Benin and Morocco, except one (Morocco’s inland city Marrakech).

In Indonesia (a midurbanized country), net emigration in cities was slightly (but not significantly) more sustained, when compared to the national-level figure (-0.2 vs. -0.1 percent, respectively). The demographic importance of the international component dominated the migration exchanges in almost two fifths of the cities (i.e., the absolute level of international migration exceeds that of internal movements; see gray areas in Figure 1 and column 6 of Table 1). More than half of the cities (54 percent) experienced net emigration, especially those located on the islands of Java and Sumatra (see column 7 and the map in the online Appendix A2). This confirms the regional geography of emigration in the country (Hugo 2007) and relates to the proximity of these islands to the main destination countries (Malaysia and Singapore). These international losses generally offset the cities' gains from in-migration (in 41 percent of cities; see column 10). This suggests population replacement or the presence of step-wise migrations—from the countryside to cities and then abroad. In another 45 percent of cities, international migration either complemented the positive balance of internal movements, or substituted for the net losses. The balance in internal movements was indeed negative in a number of cities—especially on Java and Sumatra. Despite Indonesia's relatively low level of urbanization, intercity movements are rising and tend to focus on the capital region (Nashrul, Leo and Mulder 2015). Furthermore, the capital region reveals various patterns of interactions between the two flows. While Jakarta experienced a replacement of net out-migrants by immigrants, its satellite cities in the South (Bogor and Depok) gained from both internal and international migration, with the latter even dominating in Bogor. In the Eastern satellite city of Bekasi, however, international migration depleted the gains from internal movements.

In the Philippines (another midurbanized country), the positive net international migration rate in the average city strongly contrasts with the negative estimate for the country as a whole (i.e. $+0.5$ percent vs. -0.3 percent; see column 4 and 5 in Table 1). This indicates the cities' leading role in the emerging migration turnaround. The Philippines also stands out as having the largest share of cities (71 percent) in which international migration had a stronger demographic impact when compared to that attributable to internal movements (see gray areas in Figure 1 and column 6 of Table 1), even though the majority of the population is still living in the countryside. The low level of cities' net in-migration (0.1 percent) may be related to the shift in rural exodus as migrants bypass domestic cities to head abroad. Another explanation could be the existence of balanced migratory exchanges between cities. However, almost three quarters of cities experienced net immigration, including all major urban centers on every island, as well as touristic cities (i.e., Puerto Princessa; see column 7 and the map in online Appendix A2). Manila's metropolitan area and satellite cities were the main recipients. Net immigration compensated for the internal migration losses

in 41 percent of cities, but complemented the domestic gains in almost one third (especially in the main urban centers; see columns 9 and 8 of Table 1).

In Brazil and Chile (two highly urbanized countries), the average net international migration in cities (0.3 percent and 0.4 percent, respectively) was significantly above the (almost) neutral balance observed in the countries as a whole. The demographic relevance of net international migration was more important than that of internal migration in 44 percent of Brazilian and 58 percent of Chilean cities (see gray areas in Figure 1 and column 6 of Table 1). The majority of cities (at least three quarters) had a positive international balance, while net internal migration varied substantially. In at least 42 percent of cities, international migration was complementary to the gains from in-migration. In Chile, this was the case in cities situated on the Pacific coast and on the eastern border with Argentina (an important migrant sending country; see the country map in online Appendix A2). In Brazil, only the capital and the cities in the border areas on the Northern and Southern coast fall in this group. The Northern area indeed benefited from recent government investments and a boom in the tourism industry that attracted many workers, while the strong economies in the south-west traditionally pull migrants from all over the country and neighboring Paraguay. In the second major group of cities (at least 30 percent), international migration replaced internal population losses. This can be observed in Chile's capital and Brazil's major urban centers located on the central part of the Atlantic coast (i.e., Rio de Janeiro, Sao Paulo, Belo Horizonte, Salvador, Porto Alegre; see the country map in online Appendix A2), as well as in cities in the interior of the country.

In Mexico (another highly urbanized country), the positive net international migration in the average city again contrasts with the negative national-level figure (respectively, +0.1 percent vs. -0.6 percent; column 4 and 5 of Table 1). This confirms the predominantly rural geography of emigration at the turn of the new century (Hamilton and Villarreal 2011). The majority of metropolitan populations (59 percent; column 6) were affected by international movements to a larger extent than by internal ones, but the sign of the international balance differed significantly. More than three fifths of the cities experienced net immigration, especially in the center-north of the country, around the capital, and in the east (see column 7 of Table 1 and the relevant map in online Appendix A2). This is in line, respectively, with the recent shift in the spatial focus of foreign direct investments away from the US border into the interior, the economic preeminence of the capital region, and a recent boom in the indigenous tourism industry (in the east). In 47 percent of cities, this positive net external migration complemented the net in-migration (column 8). The cities with net emigration, by contrast, are located on the southern and northern border of the country (i.e., traditional touristic centers and places of emigration to the United States, respectively), and include Mexico City, which functions as a place of transit

on the South-American migration route towards the United States. In most of these cases, the international losses offset the gains from net in-migration (25 percent of all cities).

In short, we can be confident in our indirect estimates, as the spatial patterns of the results are congruent with our knowledge of the regional geography of migration and development in each country. Cities do tend to experience higher levels of international migration when compared to the country as a whole. More than two thirds of all cities experienced a positive balance (although the confidence intervals of 36 percent and 82 percent are large). The results also confirm a rise in international migration and its growing relative importance in the cities' migratory exchanges as their countries progress through the urban transition (with Benin at the bottom and Chile and Brazil at the top of the distribution). However, this association is confounded by the pioneering role of cities in the emerging transformations of national migration regimes, such as the rise in permanent emigration from Indonesia and the migration turnaround in the Philippines, Morocco, and Mexico.

The contribution of migration to metropolitan population growth

Having established the importance of international migration for cities, we are now able to estimate the full demographic impact of population mobility. This is conjectured to rise as countries progress in their demographic transition. Table 2 provides population-weighted average components of metropolitan population growth by country.

The results confirm a dominant role for natural increase in city growth. In the average city, the annual crude rate of natural increase was 1.3 percent, or four times higher than the sum of the net internal and international migration—hereafter referred to as total migration (0.3 percent; see columns 4 and 5 of Table 2). Total migration dominated demographic change in only 12 percent of cities (column 7). Chile perfectly aligns with this average situation. Total migration was the lowest on average (and not significantly above zero) in Benin, Mexico, and Indonesia, where, respectively, none, two, and only 15 percent of metropolitan populations were primarily affected by migration. The (significantly positive and) highest average rates of migration are found in the Philippines, Morocco, and Brazil. In Morocco and the Philippines, however, total migration played a major demographic role in only one city because the average level of urban natural increase was high (at least 2 percent). In Brazil, 25 percent of metropolitan populations were predominantly affected by total migration.

These results do not confirm an association between cities' progress in the demographic transition and the role of migration in metropolitan population change across countries. The relationship may be confounded by the

TABLE 2 Average (population-weighted) rates of total growth, natural increase, and migration, as well as the distribution of cities by the dominant component of population change, 377 metropolitan areas in seven developing countries, 1992–2013

Country (1)	Number of cities (2)	Total growth rate (%) (3)	Rate natural increase (%) (4)	Total net migration rate		Total gross migration rate		Dominant component in population growth by city	
				(NMtot) (%) (5)	(GM) (%) (6)	NMtot (%) (7)	GM (%) (8)		
All	377	1.6	1.3	0.3	0.8	0.8	(0.8–1)	12	29
Benin	5	3.5	3.3	0.2	2.4	2.4	(2.4–2.5)	0	40
Brazil	128	1.2	0.8	0.4	0.7	0.7	(0.5–0.9)	25	48
Chile	26	1.4	1.1	0.3	0.7	0.7	(0.6–1)	12	23
Indonesia	59	1.6	1.6	0.0	1.6	1.6	(1.6–1.7)	15	47
Mexico	59	1.7	1.5	0.2	0.6	0.6	(0.5–0.7)	3	8
Morocco	6	2.0	1.6	0.5	1.0	1.0	(1–1.2)	0	33
Philippines	94	2.4	1.8	0.6	0.7	0.7	(0.5–1)	1	4

NOTES: Figures in parentheses = confidence intervals; gross migration refers here to the sum of the absolute net internal and the absolute net international migration rates. SOURCES: Own estimates based on www.citypopulation.de and IPUMS-international.

arrival of young migrants with high fertility. This indirect growth effect of migration probably explains why the cities' average level of natural increase is above or equal to the corresponding national-level estimate (not shown). The limited role of total migration in city growth can further be explained by the rising importance of natural increase and the declining relative growth contribution of new migrants in ever-larger population bases. Moreover, the total migration rate is low because its internal and international components often cancel each other out (see previous section). In other words, migration replaces (or recomposes) the metropolitan populations.

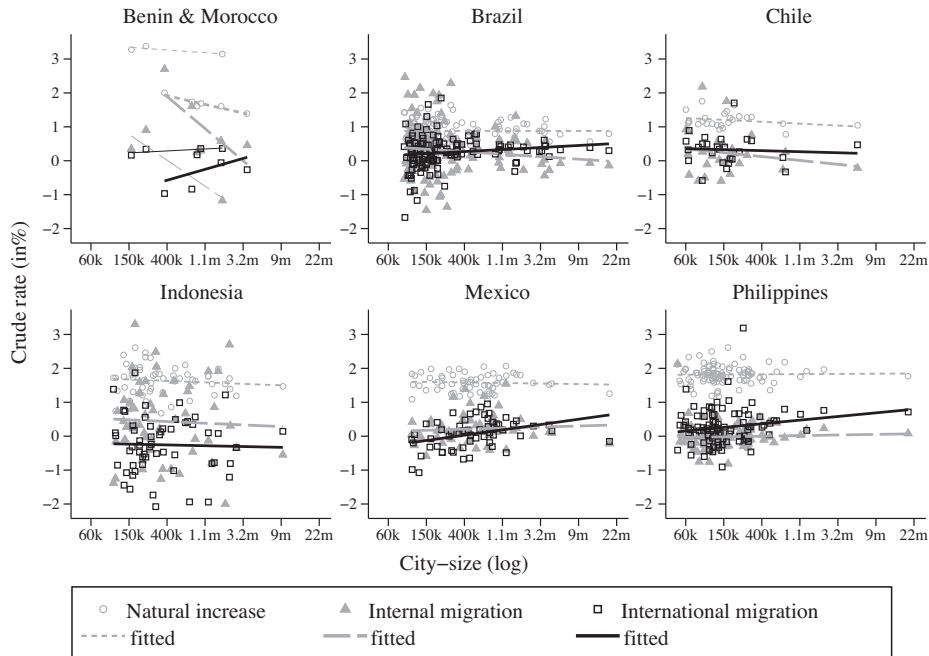
To account for this population recomposition, we summed the absolute levels of net internal and net international migration. This measure of gross migration is more than twice as high on average as total migration (i.e., 0.8 percent; column 6 of Table 2), and was the major component of demographic change or replacement in 29 percent of all cities (column 8). In all countries except the Philippines, gross migration had a significantly stronger relative demographic impact when compared to that of total net migration: it represented on average between 62 percent and 100 percent of natural increase (except in Mexico, with only 39 percent—similar to the Philippines). Gross migration was the dominant component of population change and recomposition in almost one half of Brazil's and Indonesia's cities, as well as in four out of the eleven settlements in Benin and Morocco. Hence, to fully understand the role of migration in city growth, one has to take account of the interactive effects of internal and international movements.

The growth contribution of international migration across the urban hierarchy

Given the demographic importance of population mobility and the dominance of its international component in a significant number of cities, we now explore the heterogeneity across the urban hierarchy. According to our third hypothesis, the balance and relative demographic contribution of international migration should increase as cities grow and graduate upward within the urban hierarchy. Recent cross-sectional research has indeed found higher levels of net external migration in larger when compared to smaller cities (Chen, Liu, and Lu 2018; Plane et al. 2005; Prieto et al. 2018). This confirms the dominance of socioeconomic attractiveness over the enabling factors of migration in upper levels of the urban hierarchy. However, the demographic impact of international migration also depends on the extent to which higher-ranked cities lead the secular fertility decline and experience an internal migration turnaround (from net positive to negative rates) in the national process of urban deconcentration.

In Figure 2, we appraise these questions from a cross-sectional perspective: we plot all city estimates and the linear regression line of the

FIGURE 2 Annual rates of natural increase, net internal, and international migration according to city size, 377 metropolitan areas in seven developing regions, 1992–2013



NOTES: k = thousand, m = million; in the panel for Benin & Morocco, the fine lines refer to Benin while the thicker ones pertain to Morocco, confidence intervals are not shown in order to increase legibility of the Figure. SOURCES: Own estimates based on www.citypopulation.de & IPUMS-international.

components of population change (on the vertical axis) according to logged metropolitan population size (as a proxy for the urban hierarchy; on the horizontal axis) by country.

The relative importance and demographic impact of the sources of city growth differ systematically over the city-size distribution (Figure 2). The level of internal migration tends to be more important in smaller than in larger cities—especially in Benin and Morocco, Brazil, Chile and, to a lesser extent, in Indonesia. This can be explained by the expansion of the population base over time and the out-migration from large cities to smaller settlements with better social and environmental amenities. In Benin and Morocco, a negative association with city size also holds for the level of natural increase. Large fertility differentials across the urban hierarchy are typical for early to middle stages of the demographic transition and are particularly marked in Africa (Corker 2016; Lerch 2019b). In the more advanced countries, the absence of an association of natural increase with city size is probably due to the confounding effects of differing age structures across cities.

The balance of international migration, by contrast, tends to increase with rising city size in Brazil, Mexico, Morocco, and the Philippines. While small cities experience low and often negative rates of net international migration, large cities benefit the most from immigration. This positive association is weak to moderate (with correlation coefficients situated between 0.14 and 0.44, depending on the country), and statistically significant only in the Philippines and Mexico. Nevertheless, cities with more than 500,000 inhabitants seldom experience a negative international migration balance (greater Mexico City is an exception, due to its importance as an intermediary migration step on the route to the United States).

Therefore, the frequent net out-migration in larger cities (as defined by a population of at least three million) tends to be compensated for by net immigration. Both components of migration are generally positive and sustain population growth in intermediate-sized cities (with 500,000 to 3 million inhabitants). In small cities, net in-migration was often offset by net emigration, although the growth patterns are very heterogeneous at the bottom of the urban hierarchy.

Discussion

Populations in the global South are increasingly urbanized and will soon complete the demographic transition. International migration will matter more and more for metropolitan population change and attracts increased policy attention (IOM 2015, 2017). However, our understanding of the sources of city growth and the subnational patterns of international migration is very limited. This represents a major challenge for local governments in planning development, attracting and retaining a labor force, and ensuring social cohesion in culturally diversifying societies. We combined indirect estimation techniques with the use of census records and geographic master files that define metropolitan areas consistently, to provide the most comprehensive and coherent assessment of the role of international and internal migration in recent city growth in seven developing countries.

We found that cities' net international migration is generally positive. The rates are higher on average than the levels observed in their respective countries as a whole, and have a larger demographic impact than internal migration in half of the 377 settlements. The higher level of international migration in cities in more urbanized and developed countries (e.g., Chile and Brazil), as well as in periods of swift economic growth (as in the Philippines), confirms the importance of economic pull factors and the cities' role as national immigrant gateways.

As suggested by the mobility transition hypothesis, we found that cities pioneer new patterns of international migration in their country. Cities drove the onset of permanent emigration from Indonesia, probably because they channel internal movements and enable potential emigrants to acquire

the capacities to settle abroad. In the more advanced stages of mobility transition attained by Chile, Mexico, and the Philippines, where the opportunities to emigrate have already diffused to peripheral areas, cities often experienced net immigration. While the culture of emigration may persist in the countryside in spite of sustained economic growth, the rising attractiveness of cities explains their vanguard role in a country's migration turnaround. The international labor force sustains economic development in cities and compensates for the foregone rural exodus during the second urban transition. However, the period of migration turnaround is also characterized by a significant heterogeneity between cities in their levels of international migration, as observed in Mexico: besides the emergence of new immigrant destinations, other cities continue to function as transit zones for stepwise emigrants, or become major sending areas of a new and increasingly select outflow of highly skilled and opportunity-seeking individuals (Garip 2012).

In other words, international migration not only constitutes a move between countries, but very often also between cities, where the demographic impact is particularly significant. Natural increase still dominates recent city growth, but the indirect growth contribution of migrants through their births remains to be assessed. Our results reveal a major impact of gross internal and international migration on population growth and replacement in almost one third of all cities. Furthermore, the relative contribution of international migration rises with the exhaustion of in-migration potential from the countryside and increasingly balanced domestic flows between cities in more urbanized countries. Given the concentration of the demographic, economic and social impacts of international migration in cities, we need to better understand its urban geography.

We have shown that international migration concerns all levels of the urban hierarchy, but in different ways and to various extents. As expected, the net flows were the largest in primary cities that act as the commanders of global economic interactions. In primary cities of more urbanized countries (i.e., Chile and Brazil), international migration compensated for the internal movements down the urban hierarchy. In less urbanized contexts (i.e., the Philippines), international flows complemented the gains from internal migration. Surprisingly, intermediate-sized cities also often experienced net immigration—even though the level was lower than in primary cities. This challenges the world-city hypothesis (Sassen 2001) that predicts an absorption of immigrants by the main economic centers of countries. The attractiveness of intermediate-sized cities may be explained by the increased regionalization of international migration worldwide (Czaika and de Haas 2014). Mobility between neighboring countries may benefit a larger range of cities, including regional centers in border areas (as in Chile, Mexico, and Brazil).

Intermediate-sized cities actually are the main winners of population mobility across the urban hierarchy, because international migration

complements the generally positive balance of internal movements. This is not surprising given these cities' diversified labor markets, their role in the regional diffusion of economic development within countries, and their less congested residential contexts. By contrast, the push- and enabling factors of migration seem to dominate in a number of small cities, where a negative international balance often depleted the gains from net in-migration (especially in settlements located on international migration routes). More research is needed to better understand the attraction and repulsion factors of migration across the urban hierarchy. This endeavor should move beyond the descriptive approach we have adopted here, in order to identify causal pathways between the cities' locational attributes and socioeconomic development, on the one hand, and their patterns of migration on the other hand.

Before concluding with the main implications of this analysis, we discuss its limitations. First, we have provided the first comparable evidence about international migration in cities in the global South, but the uncertainty of the indirect estimates is important due to several reasons: the low incidence of the event, the reliance on census samples, and the potential estimation biases related to the uncertain quality of the data—especially for small metropolitan populations. However, our conclusions are robust according to our confidence intervals that assume a common intercensal differential in enumeration completeness or sampling quality. Second, to better understand how migration recomposes metropolitan populations, a natural extension of this analysis would be to focus on directional (rather than on net) flows. Third, we did not distinguish the migrants' contribution to natural increase. This indirect demographic effect probably confounds the assumed positive association between the cities' progress in the demographic transition and the importance of migration for population change. Fourth, this analysis is only an initial step towards a better understanding of migration dynamics across the urban hierarchy. To better relate the results to the development process, future research should classify cities based on functional criteria (rather than only population size) and adopt a longitudinal perspective to account for path dependency in the development and the migration phenomena.

This analysis has revealed for the first time the importance of international migration for a large range of cities in developing countries. As cities not only attract but also enable international migration, countries' urbanization potentials are to a certain extent redistributed globally, which has implications for the international geography of development. Cities also constitute the spatial locus where the internal and international flows interact with one another. The recognition of these interlinkages is crucial for our understanding of the relationship between the processes of international migration, urbanization, and development of countries, as well as for the inequalities within the urban hierarchy, and urban governance at the city

level. Future assessments of city growth in the global South should therefore systematically consider both internal and international movements. As international migration increasingly takes place within the global South, with many low-skilled migrants who often face social exclusion (Balbo and Macroni 2006), more research is needed to better understand its role in the population recomposition of cities along ethnic and socioeconomic lines to enhance social cohesion in diversifying societies.

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Data availability statement

The data are freely accessible at <https://international.ipums.org/international/> and <http://citypopulation.de/>

Ethics approval statement

We analyzed anonymized secondary census data.

Conflict of interest

The author declares no conflict of interest.

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