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International Migration and the Growth of Zurich, 1836–1949

Although the theory of the demographic transition includes the three components of mortality, fertility, and migration, migration flows are often relegated to the background in the study of the dynamics of populations in transition. Disregarding them considerably simplifies the models, but the underlying assumption of their minor impact on growth is not always verified, particularly at the local level. In this article, the author investigates the dynamics of a European urban population during the industrial revolution and migration's direct (net migration) and indirect (natural increase) impact on these dynamics. This case study provides insights into past but also current dynamics in populations still experiencing strong demographic growth.

The higher demographic growth in urban than in rural areas and the associated process of urbanization are among the most important transformations in modern population geography. Evidence on the demographic sources of this process is limited, however, especially for individual cities, and while the literature focuses on the respective roles played by natural increase (i.e. births exceeding deaths) and internal migration, it commonly disregards the international migration component of city growth. Apart from problems related to data availability, this omission may be related to a methodological nationalism that removes city growth from any international context (Wimmer and Glick Schiller, 2002; Bocquier and Costa, 2015).[1] While cities constitute the main engines of modern socioeconomic development, they compete with one another for investment, talent, and labor force

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[1] Wimmer and Glick Schiller (2002) define methodological nationalism as "the assumption that the nation/state/society is the natural social and political form of the modern world" (p. 302). This assumption may be based on ignorance of international relations' importance to the studied phenomena, scientists adopting nationalist discourses, or the "territorialization of social science imaginary and the reduction of the analytical focus to the boundaries of the nation-state" (p. 307).

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on national as well as international scales (Sassen, 1994). To better understand the relationship between the city's economic and demographic fortunes, researchers need to better understand the geographical sources of migrants and the associated diversification of the city population over time. To this end, we analyze the contribution of internal and international migration to city growth, specifically by taking a long-term perspective on Zurich during its Industrial Revolution.

A long-standing debate has surrounded the demographic components and socioeconomic correlates of the urban transition from a mainly rural to predominantly urban society. Many geographers and economic historians attribute a primary role to migration in the process of urban growth, noting that the parallel rise of the Industrial Revolution and opportunities for upward social mobility led to rural inhabitants being drawn into cities in a process facilitated by the development of transportation infrastructure (Ravenstein, 1889; Zelinsky, 1971; Kelley and Williamson, 1984; Todaro, 1984). From a demographic perspective, however, urban growth stems primarily from a sequential decline in mortality and fertility, a phenomenon referred to as the demographic transition. De Vries proposed a three-stage model based on historical evidence in Europe (de Vries, 1990; Dyson, 2011). In the first stage of the European urban transition, dense city environments were marked by insalubrity and the spread of diseases. In-migration from the countryside necessarily compensated for these urban demographic sinks, where deaths outnumbered births. The second stage was characterized by a decline in urban mortality during the opening phase of the demographic transition, an advance achieved by 19th-century European sanitary developments that ultimately spread around the world during the 20th century (Fox, 2012). Consequently, positive natural population change sustained the effect of rural-to-urban migration by unleashing urban growth. With an increasing number of urban inhabitants, natural increase eventually dominated the process, thus marking the third phase in de Vries's model of the urban transition.

The sources of urban growth in developing countries since the 1960s have been successively assessed, and they confirm a dominant role of natural increase (Preston, 1979; Chen et al., 1998; Jedwab et al., 2017). Historically, however, migration often dominated as cities remained demographic sinks (even after mortality declined) due to their taking the lead in the spatial diffusion of birth-limiting behaviors (Bairoch, 1985). Bocquier and colleagues reconciled the two perspectives by arguing that the demographic pattern of urban growth depends on the temporal sequence of the demographic transition and the onset of modern economic development (Bocquier and Costa, 2015; Bocquier and Bree, 2018). In the 19th-century urbanization of Sweden, France, and particularly Belgium, migration was an important or even principal factor in urban growth, which intensified only when urban fertility was already low. The main drivers of urban growth were thus the structural changes in the

labor market that attracted migrants from rural areas. Similar cases can be found in contemporary China and Southeast Asian countries (Hugo, 2014).

However, urban growth is a more complex process than this conventional dichotomy between natural increase and domestic rural-to-urban migration (Lerch, 2014). A small number of authors have stressed the role of international migration ever since the classic hypothesis of mobility transition was proposed (Zelinsky, 1971; Skeldon, 1990). This hypothesis conjectures that population pressure during the opening phase of the demographic transition motivates rural dwellers to move either toward domestic cities or abroad, with internal and international destinations tending to be substitutes for each other: migrants in historical Europe and the contemporary Global South move domestically in periods of development and head toward more attractive places abroad during crises (Thomas, 1973; Massey, 1988; Skeldon, 2008; Lerch, 2014). Rural out-migrants may thus bypass domestic cities, thereby redistributing the potential for city growth to other countries. Moreover, city growth in the Americas and Maghreb during the Old Regime largely depended on international migrants, who often originated from European cities (Baines, 1985; Bairoch, 1985). As countries urbanize and develop economically, their cities also tend to attract migrants from other (less developed) countries, thereby compensating for the shrinking domestic labor force in rural areas (Zelinsky, 1971; Skeldon, 2008). To appreciate the role played by economic forces in city growth over time, we believe it is crucial to consider both internal and international migration. As we broaden our perspective beyond national borders, we must also account for the geopolitical context of cities.

The interactions between migration and fertility add another level of complexity to the city growth process, as revealed by extensive research into the contributions of internal migrants to urban natural increase in the early stages of the urban and demographic transitions (Martine, 1972; Martine, 1975; Goldstein and Goldstein, 1981; Brockerhoff, 1998; Rokicki et al., 2014). This indirect growth effect of migration in the later transition stages has attracted little attention, however, despite low urban fertility increasing its importance. Migration tends to redistribute populations from less advanced areas—in terms of socioeconomic and demographic change—toward nodes of innovation and modern development, thus increasing the heterogeneity of demographic behaviors among populations in central places.

In sum, three interlinked aspects that are poorly understood at the city level are the role of international migration, its interaction with internal movements, and the indirect demographic effects of migrants. This article addresses that lacuna by revealing the role played by the international context and by policy in forming migration patterns during the city growth process. We focus on the city of Zurich, Switzerland, between 1836 and 1949 for three reasons. First, the extended historical perspective allows us to focus on long-term demographic trends, thus deepening our understanding of migration patterns over time relative

to the dynamics of international development. Second, the city experienced a particularly fast—albeit discontinuous—process of socioeconomic change over this period, when Switzerland transformed from one of the poorest countries in Europe to one of the richest societies in the world, with Zurich emerging as a leader in this process. Third, Switzerland's small size and central location in Europe are associated with more intense international migration, whose impact on city demography can thus be better exemplified. Hereafter, this article will use the terms net *out-* or *in-migration* as synonyms for, respectively, negative and positive balances in movements within Switzerland. Net *emigration/immigration* refers to negative/positive balances in international flows.

To lay the foundations for our hypotheses about its underlying demographic components, we begin by contextualizing Zurich's development. We then present the data and estimation methods, followed by a description of trends in natural increase and total migration. Next, our analysis is disaggregated by citizenship to account for both internal and international migration, as well as for the city population's heterogeneous reproductive behaviors. The results are discussed in the context of Zurich's demographic, socioeconomic, and political standing in the international arena.

I. The city of Zurich in context

Over the period of interest (1836–1949), Switzerland and its city of Zurich transformed tremendously. The small, landlocked, and mountainous country was endemically poor until the mid-19th century, when it began to industrialize later than other European countries. Rural areas were scattered with proto-industries in the form of home production due to the lack of natural resources and the reliance on water for energy, as well as to the late arrival of the railway (Mayer, 1952; Bergier, 1983; Walter, 1995). Between the 14th and 18th centuries, Switzerland's population increased slowly from 600,000 to 1.7 million inhabitants (Table 1). Labor surplus was constantly exported abroad as over a million Swiss served as mercenaries in European armies and annual average net international emigration remained at around 3 per 1,000 inhabitants, representing half the rate of natural increase (Mayer, 1952; Bergier, 1983).

Zurich stood at the center of a regional network of rural home industries processing silk and cotton. Following four centuries of slow population growth and intermediary periods of decline, the city counted about 10,500 inhabitants in 1799, ranking it at only fifth in the Swiss urban hierarchy (Historical Statistics of Switzerland, 2021). By comparison, the cities of Augsburg and Stuttgart (located about 200 km north of Zurich in today's Southern Germany) already numbered over 100,000 residents each (Bergier, 1983). As with industrialization, Swiss urbanization lagged behind the rest of Europe. Furthermore, Zurich's growth was constrained by the historical city walls because the city's guilds restricted residence rights until 1850.

Table 1. Population of Switzerland and the city of Zurich, 1400–1950

Year	Total population	
	City of Zurich	Switzerland
1400	5,250–6,100	625,000
1600	-	1,000,000
1671	9,500	-
1798/99	10,500	1,680,000
1836/37	29,282	2,188,000
1850	35,466	2,393,000
1900	150,242	3,315,000
1950	390,020	4,700,000
Sources: Statistisches Amt der Stadt Zürich Yearbooks (1909–1949); Historical Statistics of Switzerland (2021); Mayer (1952).		

Yet Zurich benefited from a strategic geopolitical position that played a major role in its subsequent development. Situated on the pre-Alpine plateau to the north of the Gotthard mountain range, Zurich constituted a historical enclave of Protestantism situated on the communication and commercial routes between two major developing and predominantly Catholic areas: Baden-Würtemberg (Southern Germany) and the Kingdom of Italy (south of the Gotthard). Before construction of the Gotthard tunnel to the south, the city had already integrated northward into the more accessible transnational and German-speaking labor market. Zurich was also a liberal city-state within the neutral Swiss Confederation (founded as a union of cantons in the 13th century and refounded as a confederation in 1848). Given the European context of failed revolutions and wars, the city hosted European refugees (especially from France and Italy) who had been persecuted for religious reasons and by restored monarchies (Bergier, 1983).

With the onset of the demographic transition in the 19th century, Switzerland's population more than doubled to 3.3 million inhabitants in 1900. Emigration continued at a sustained pace and became increasingly oriented toward overseas destinations (Mayer, 1952; Hatton and Williamson, 1998). However, immigration from European countries rose progressively, with Switzerland's migration balance turning positive for the first time in the last quarter of the 19th century. The diversification of the economy and the construction of transportation infrastructure and housing generated skill-intensive as well as physically demanding and dangerous jobs taken up by foreign workers, mainly from Germany and later Italy—a country particularly hard hit by economic restructuring, agricultural crises, and wars (Holmes, 1988; Walter, 1995; D'Amato, 2008).

Our observation period is marked by a fast catch-up of urbanization in Switzerland as the proportion of inhabitants living in cities with more than 10,000 inhabitants increased from 6% in 1850 to 45% in 1950 (Mayer, 1952). During this time, Zurich transformed into the national economic capital, with

an emerging mechanical and engineering industry, and it acquired world status as a city of finance and highly specialized services.

Zurich's economic boom can be explained by various factors (Bergier, 1983). Refugees brought capital and skills. Switzerland's first commercial bank was founded in Zurich in 1856. Following Germany and Austria, technological developments were spurred by establishing quality educational institutions, such as the Swiss Federal Institute of Technology in 1855. Establishment of the rail system in the last quarter of the 19th century improved the city's connections with other regions, both within Switzerland and abroad, while the creation of the electrical grid allowed industry to be spatially concentrated in urban agglomerations. These changes boosted Zurich's industrial production and demographic growth. Whereas the population increased by one-fifth between 1760 and 1836 (to 29,300), it multiplied by a factor of more than 5 in the subsequent period until 1900, when it reached 150,000. By 1950, the number of inhabitants more than doubled again to 390,000 (Statistisches Amt der Stadt Zürich, 1909–1949).

II. Hypotheses about the components of Zurich's population growth

Before laying down our hypotheses regarding the demographic sources of this rapid population growth, we must comment on the city's particular (although poorly documented) fertility transition. Zurich had played a pioneering role in the diffusion of birth limitation since the mid-17th century in Europe, which was linked to Protestant ethics that promoted rationalizing interrelated economic and reproductive decisions (Pfister, 1988). While protoindustrialization differentiated the city population's social structures, social mobility remained largely based on acquiring political functions. As the number of city council seats remained constant, upward mobility became increasingly dependent on prestige gained by accumulating ever larger amounts of material resources. Pfister (1988) argued that birth limitation emerged among couples wanting to spend more on consumption in order to elevate their political status, which reduced any financial resources remaining for family maintenance. This new behavior subsequently spread among Zurich's population, with the total fertility rate (TFR) dropping to near replacement levels (e.g.g   children per woman) by the turn of the 20th century (Statistisches Amt der Stadt Zürich, 1909–1949). At that time, Switzerland's population had just begun its secular fertility decline.

Given Zurich's advanced fertility transition, natural increase can be expected to have played a minor role in population growth. We hypothesize important contributions from internal migration. Development of modern industry and the increased importance of cities in Switzerland's economic geography were major pull factors of migration; while, on the push side, sustained population pressure in the countryside was exacerbated by the de-

cline in rural home industries and agriculture, which thus deprived peasants of two main sources of livelihood. Out-migration pressure was highest in the protoindustrial sector, which was a major lifeline for poor, underprivileged, and landless peasants. Supplementary income from home industries facilitated their avoiding Malthusian preventive checks on population growth for a longer period compared to landholding peasants (Braun, 1978). This pressure for rural out-migration was exacerbated by several famines, especially during the 1845–1848 European agricultural crisis. With the new Confederation established in 1848 came a political context that also facilitated mobility, due to the lifting of cantonal restrictions on people moving freely and of Zurich guilds' protective rules for industry and residence (Mayer, 1952; Walter, 1995). We thus hypothesize a rising net internal migration in Zurich over time.

The city's economic development trend was interrupted several times, however, by major industrial and financial crises (in 1873 and the 1880s) as well as by two World Wars and their subsequent economic depressions. As emigration from Switzerland historically constituted a third major lifeline for peasants, potential migrants to Zurich may have substituted foreign destinations during economic crises. We conjecture that short-term fluctuations in Zurich's net internal migration levels closely follow the city's discontinuous process of economic development, with a higher positive balance in times of growth and lower levels during economic reversals. In contrast, an inverse relationship should exist between the city's business cycle and international emigration levels from Swiss regions where most of Zurich's internal in-migrants originate, meaning that the international migration balance will be strongly negative in periods of crisis and closer to zero in periods of development.

While push factors of international migration predominated, major pull factors must also be acknowledged. Switzerland is a small country with a liberal political regime at the center of Europe. As the geomorphological barriers to international travel were removed via railway lines, Zurich became integrated into the Southern German and Northern Italian transnational region of industrialization, which contributed to the city's economic development. We thus conjecture an increase in Zurich's net international migration balance throughout the 19th century. With the end of the Old Regime and Europe's introduction of national passports in 1910, however, migration policy should have significantly impeded cross-border movements. Given the legal restrictions imposed on immigration to Switzerland during the period between the beginning of the First World War and the end of the Second World War (Ruedin et al., 2015), we expect that the external migration component of Zurich's growth was reduced.

In addition, we conjecture indirect structural and behavioral effects of internal and international migration on Zurich's population growth. Migrants were mostly young adults and originated from less advanced areas in the demographic transition, which should lead to higher levels of natural increase compared to Zurich's local population.

III. Data and methods

1. Data

We estimate and describe trends in internal and international migration and natural increase for the city of Zurich. The city's demographic yearbooks (Statistisches Amt der Stadt Zürich, 1909–1949) were used to compile annual population counts and demographic events since 1873 and for census years starting in 1850; while isolated counts before 1850 have been compiled by the Forschungsstelle für Sozial- und Wirtschaftsgeschichte (FSW) at the University of Zurich (Historical Statistics of Switzerland, 2021).[2] These data cover the period 1760–1949, and their sources are historical censuses and civil (parish) registers of population, births (baptisms), deaths (funerals), arrivals to and departures from the city, and changes in citizenship. Our descriptive analysis focuses on demographic changes between 1836 and 1949, as we lack statistics by migrant status for earlier periods (see below). Previous trends are estimated only at the city level and serve to contextualize our results.

Although we lack a rigorous analysis of data quality, historians agree that the quality significantly increased over the 19th century. Municipal population counts before 1850 were enumerated by priests in parish registers and are considered incomplete (Ritzmann-Blickenstorfer and Siegenthaler, 1996). While the number of inhabitants was often undercounted, the possibility of over-counting cannot be dismissed, especially in smaller and fast-growing munic-ipalities, because priests' salaries were determined by the municipality's population size (Bickel, 1947). Enumeration became more complete in 1860 with the first national-level population census that followed modern scientific principles (Schumacher, 2010), which was organized by the newly created Federal Statistics Bureau and conducted at the household level. While census quality significantly improved, especially between 1880 and 1888, compara-bility is limited by inconsistencies in population definitions. The published results from the 1860, 1888, and 1900 censuses refer to the de jure population, whereas the 1870 and 1880 rounds provide de facto estimates. However, the difference is likely to be small for a city as relatively large as Zurich (Schumacher, 2010).

As baptism and funeral registrations were already well established in Protestant cities (especially Zurich) in the 18th century (Bickel, 1947), we can be confident of the completeness of these data. However, nonmarital births are not included, thus limiting comparability with subsequent civil registration data (12% of all births in 1914 were out of wedlock; Statistisches Amt der Stadt Zürich, 1909–1949). As with population growth, birth rates therefore tend to be underestimated until the mid-19th century. Starting in 1876, official record-ings of births, deaths, and migrations were virtually exhaustive (even for

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(2) The database is available at https://hsso.ch/

residents with nonlocal citizenship) because these data formed the basis of the city's tax revenues (Ritzmann-Blickenstorfer and Siegenthaler, 1996).[3]

Changes in Zurich's spatial extent since the 18th century may further affect data comparability over time. Until 1849, the historical city walls defined the municipal territory situated on Lake Zurich, which stretches to the southeast (see green area in Figure 1). The demographic counts for years 1850 to 1933, however, include the surrounding communes reclassified in 1893 (light gray). As most of the population remained contained within the city walls until 1849 and the outlying areas were quickly urbanized thereafter, this discrepancy in spatial definitions is consistent with the city's evolving built environment and should not significantly impact the results. However, data for the period 1934–1949 include eight additional reclassified municipalities. We have to assume that the post-1933 reclassified population behaves similarly to that contained in the previous city limits. The results (below) indeed show no abnormal trend changes in 1934.

Figure 1. Map of the spatial extension of Zurich, 1800–1949
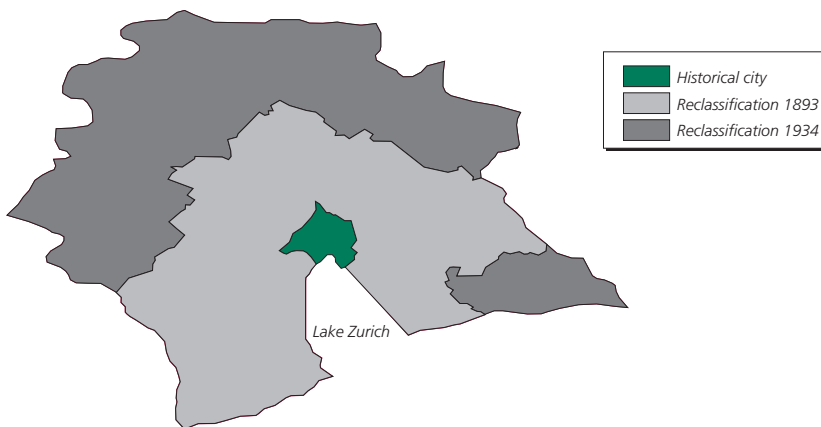
We estimated, based on aggregates, the Zurich population's annual total growth rate (TGR), crude rate of natural increase (CRNI), and crude rate of net migration (CRNM). The method varies according to raw count availability and level of disaggregation (see Figure 2 for an overview).

## 2. Demographic estimations at the city level

Total population counts are available on an annual basis from 1895 onward and can be complemented with previous census statistics (1836, 1850, 1860, 1870, 1880, and 1888) and parish registers (1760, 1798, and 1812, compiled

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[3] For overlapping years (1905 onward), we cross-validated the recorded net migration (in numbers) with indirect estimates based on the annual aggregate demographic balancing equation, thus finding the two series to be highly consistent with each other (not shown) and inspiring our confidence in using these data.

by the FSW) to estimate average annual population growth rates. Annual vital statistics are available from 1876 onward, from which point we can estimate the crude rate of natural increase. We rely on the numbers of baptisms and funerals recorded in 1760, 1798, 1812, and 1836 (compiled by the FSW) to estimate the natural increase for these years; we assume that the level changed linearly over the subsequent 40-year interval without data until 1876. The assumption behind this interpolation is that the city's demographic transition was a continuous process.[4]

Annual numbers for total in- and out-migration are published only since 1905. We thus obtained the CRNM by decade from 1836 to 1875 and by year from 1876 to 1904 as the residual from the intercensal or annual demographic balancing equations (i.e., CRNM = TGR – CRNI). This residual migration estimate should not be strongly biased, as both population and birth registrations were incomplete until the 1870s, and we thus assume that the biases cancel each other out.

Figure 2. Estimation methods of total growth, natural increase, and net migration for Zurich's total population, by citizenship, 1760–1950
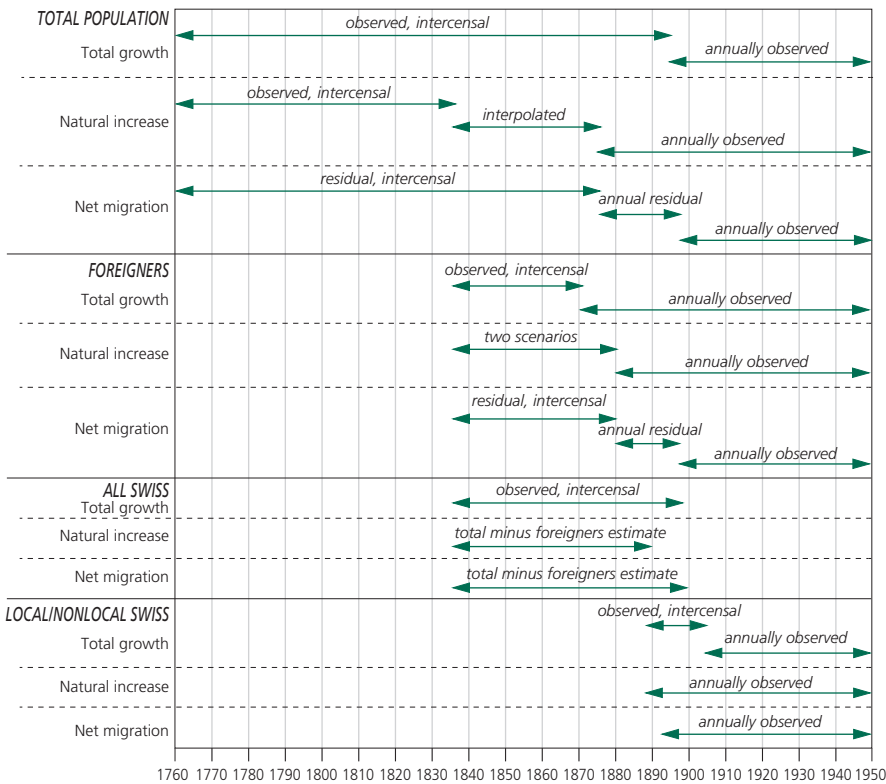
Source: author's construction.

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(4) Although mortality may have temporarily increased during the rapid industrialization of the second half of the 19th century, birth rates are also likely to have risen due to in-migration.

3. Demographic estimations by migrant status

To disaggregate migration into its internal and international components while also accounting for the heterogeneity of natural increase, we estimated the growth components according to migrant status as measured by citizenship. Citizenship is defined at the municipality level according to *jus sanguinis*, meaning that citizenship is transferred from parents to children. The statistics determine a newborn's citizenship by the status of the mother, who was granted her husband's citizenship through marriage. If the mother's citizenship is unknown, the newborn takes that of the father. Three subpopulations are distinguished: the citizens of Zurich (hereafter referred to as *local Swiss*), other Swiss nationals (*nonlocals*), and foreigners. However, we lack direct information about the place of departure of the in-migrants and immigrants and about the place of destination of the out-migrants and emigrants. We therefore follow Mayer (1952) in interpreting, on the one hand, the migration balance of Swiss citizens as the city's demographic gains from internal movements and, on the other hand, the migration balance of the foreign population as the city's net international migration.[5] This approach may introduce biases in both the internal and international migration estimates. First, we are unable to differentiate between foreigners' secondary domestic migrations and truly international moves, as foreigners who earlier immigrated into Switzerland and subsequently moved from a given Swiss region to Zurich are wrongly counted as international migrants (international flows are thus inflated, while internal migration is deflated). Second, the international movements of Swiss citizens in Zurich cannot be identified because those who moved or returned from abroad are wrongly counted as internal migrants (internal migration is thus overestimated, while international flows are underestimated). As the two biases cancel each other out, we believe that our citizenship-based measures of internal and international migration adequately reflect Zurich's population mobility patterns.

Swiss citizens represented 89% of Zurich's population in 1836 against 78% in 1888. The more disaggregated data for this later year show that only 26% of the population was local Swiss and that 52% originated from the rest of Switzerland. The share of foreigners increased from 22% in 1888 to 34% in 1913 and then declined to only 9% in 1949. One problem with using citizenship-specific statistics is that they do not perfectly represent the structure of the population according to its place of socialization: only two-thirds of the individuals born in Zurich had local citizenship rights, according to FSW (Historical Statistics of Switzerland, 2021). Using the citizenship criteria therefore tends to underestimate the net migration and natural increase of locals and to

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(5) Figures for net internal and international migration by citizenship include the demographic effects of naturalizations until 1892 because changes in citizenship are documented only after that date. This should not significantly bias the results because the number of naturalizations was limited. Subsequent statistics enable us to control the migration estimates for each citizenship group's population changes due to foreigners acquiring local citizenship.

overestimate the demographic change attributable to migrants (i.e., nonlocal Swiss and foreigners). Although this attenuates the differentials in demographic behaviors (as reported below), the validity of the results is not affected.

Vital rates by citizenship can be estimated on an annual basis from 1881 onward. As the migration counts start only in 1905, we obtained the intervening migration flows indirectly as the residual from the annual demographic balancing equations, by citizenship. For the 1836–1881 period, only intercensal population growth rates can be computed by citizenship. We therefore developed two plausible scenarios regarding the foreigners' rate of natural increase and then estimated the other quantities indirectly. In the first scenario, the foreigners' 1836–1881 CRNI is hypothesized to remain constant at its earliest available figure (e.g., 2% in 1881). In the second, we assume only half that level on the premise that the 1880s estimates may have been inflated by structural effects related to the large-scale immigration of young adults. This enables us to estimate the net international migration rate as the residual from applying the demographic balancing equation to foreigners. These residuals are conservative estimates of international migration, as we assume positive levels of natural increase among foreigners even though the 19th century is commonly viewed as a time when cities transitioned from being demographic sinks to exceeding in births over deaths. By combining these demographic rates and foreigners' population counts, we obtain the number of demographic events among foreigners. The Swiss natural increase and net migration is then obtained by differentiating between the total counts at the city level and those estimated for foreigners.

The components of population change by citizenship are finally expressed as rates relative to the total population of Zurich (rather than to the citizenship-specific at-risk populations). This enables us to directly assess the contribution of group-specific demographic dynamics to the overall growth of the city.[6]
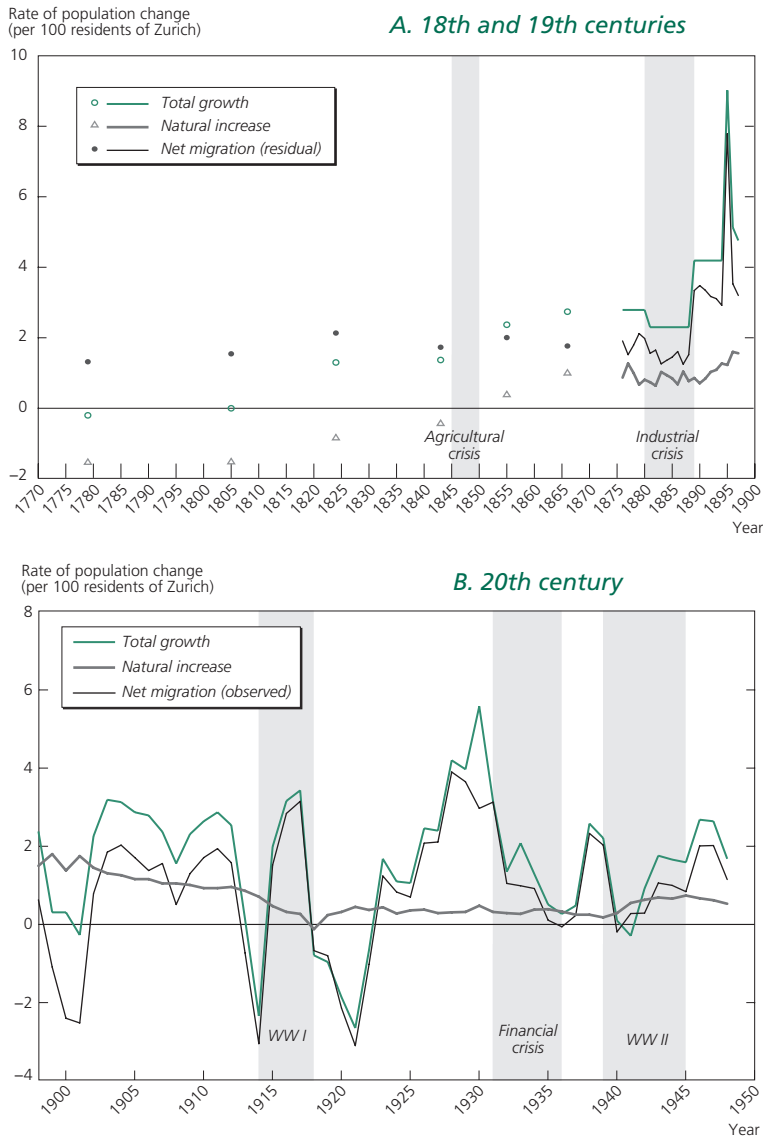
We are unable to quantitatively test the relationship between migration trends and the economic development process because Zurich's statistical yearbooks provide no economic statistics for the 19th century. However, we qualitatively evaluate the relationship by interpreting the migration trends with reference to the economic history literature.

IV. The growth of Zurich and its demographic components

Figure 3 shows the trend in the total annual growth rate and its demographic components (natural increase distinguished from total net migration). The growth rate rose from slightly negative values in the second half of the 18th

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(6) The trends in these rates may be altered by each group's representation changing within the total city population over time, as the rates do not relate events to the appropriate citizenship-specific at-risk populations. An analysis of proper citizenship-specific rates (not shown) confirms the trends and differentials reported below, although the latter are attenuated.

Figure 3. Annual total growth rate and crude rates of natural increase
and net-migration, Zurich, 1760–1949

Rate of population change
(per 100 residents of Zurich)

A. 18th and 19th centuries

B. 20th century

Sources: Statistisches Amt der Stadt Zürich Yearbooks (1909–1949); Historical Statistics of Switzerland
(2021); indirect estimates by author.

century to positive levels in 1812–1850 (1.3% per year). The rate continued to
increase until peaking above 5% in the early 1890s. The subsequent trend is
highly volatile, with a sharp drop to negative growth levels in the early 1900s,
followed by a recovery and subsequent drops immediately before and after the

First World War, then a renewed peak above 5% in the late 1930s. The later growth trend remained positive, except during the Second World War.

Despite the sharp increase in the number of city inhabitants over time, net migration clearly dominated city growth over the 180-year observation period, with a statistically significant correlation coefficient of 0.88 between the two rates against 0.35 between the natural increase and total growth rates (not shown). The rate of net migration was at least 1.6% throughout the 18th and 19th centuries. The only exception was a temporary collapse during the European industrial crisis of the 1880s. This was followed by a renewed migration peak above 5% in the 1890s. Although the levels were generally positive in the 20th century, the annual estimates reveal strong volatility, with peaks above 3% and troughs down to below –2%. The next section evaluates the roles of internal and international movements.

Positive net migration counteracted the natural decline of Zurich's population until 1850. De Vries' second phase of the urban transition began only in the second half of the 19th century, when the balance between births and deaths turned positive and thus sustained city growth. Natural increase progressively peaked at 1.8% in the 1890s. This is surprising, as the city's TFR was already below 3.0 children in that period (Statistisches Amt der Stadt Zürich, 1917). This peak in natural increase, however, was followed by a fast decline to levels below 0.5% from 1915 onward, with minor fluctuations in subsequent years until the onset of the baby boom in the 1940s (as exemplified by a modest rise in natural growth). As the rate of migration was, on average, 2 times greater than natural increase over the whole observation period, the case of Zurich challenges the notion of natural increase playing a primary role in city growth.

V. Net migration by citizenship

The analysis of demographic changes by citizenship enables us to consider the internal and international components of migration. Figure 4 shows the trends in internal and international net migration (approximated by balances in the movements of Zurich's Swiss and foreign populations, respectively), expressed relative to the total number of city inhabitants. We first describe the 19th-century trends, for which the data cannot distinguish local and nonlocal Swiss, and we then comment on the more detailed estimates starting in 1893.

1. 19th-century trends

While international net migration exhibits an overall rising trend, net internal migration surprisingly first declines before recovering at the end of the 19th century. Starting from a relatively high rate of almost 2%, net internal migration steadily declines following the late 1840s famines until reaching

Figure 4. Crude annual rates of net migration by citizenship group (distinguishing between local and other Swiss from 1893 onward), Zurich, 1836–1949

Rate of net migration
(per 100 residents of Zurich)
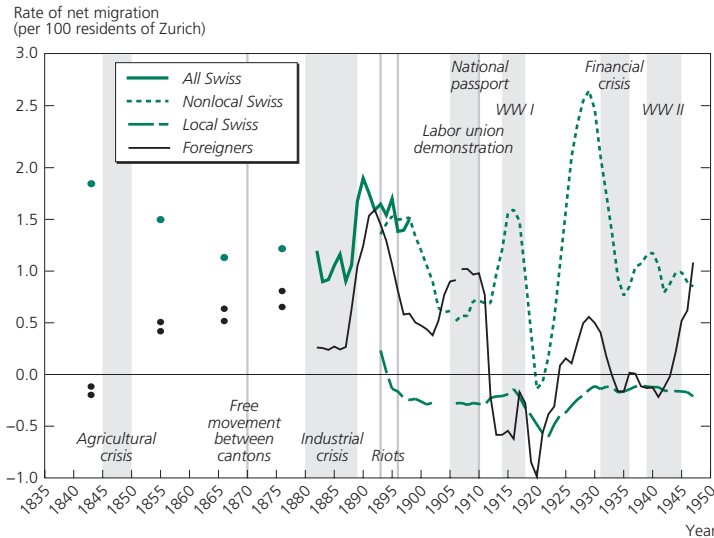
Notes: The migration balance among Swiss citizens indicates the city's net gains from internal movements; the migration balance among foreigners measures trends in Zurich's net international migration. Lines indicate annual estimates (controlled for naturalization) and residuals; dots designate intercensal residual estimates. The two sets of intercensal migration residuals for foreigners are based on two different scenarios for their natural increase levels; the all-Swiss results (obtained by subtracting migrations attributable to foreigners from the total number of migrations) do not significantly differ between these scenarios due to the larger Swiss population relative to foreigners.
Sources: Statistisches Amt der Stadt Zürich Yearbooks (1909–1949); Historical Statistics of Switzerland (2021); indirect estimates by author.

1.1% in the 1860s. However, after the cantonal restrictions on the free movement of people were lifted, in-migration to Zurich recovered in the 1870s. The rate dropped again to 0.9% during the European industrial crisis of the 1880s and returned to peak levels of above 1.5% in the 1890s.

How does this trend in internal net migration to Zurich from the rest of Switzerland compare with overseas emigration waves? To test the links between the Swiss population's domestic and international rural exoduses, our estimated number for Zurich's net internal migration is expressed relative to the enumerated populations of the main migrant-sending cantons[7] (as compiled by the FSW). We estimate the rate of net out-migration from these cantons to Zurich, which we then compare to the overseas emigration rates from the same Swiss cantons using the numbers of overseas departures compiled by the FSW (Figure 5). Although a significant share of overseas migrants may have moved back to Switzerland, we are unable to account for these reverse flows due to the lack of data. This should not affect the validity of our results, as returnees

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(7) Uri, Schwyz, Unterwalden, Zug, Basel, Schaffhausen, St. Gallen, Graubünden, Argau, and Thurgau.

are likely to have settled in major urban centers of Switzerland rather than in their remote areas of origin, where employment opportunities were limited.

During the period covering the agricultural crisis of the late 1840s to the 1860s, Swiss overseas emigration was at least twice as important as net out-migration to Zurich (respectively, at least 2.0 vs. 0.5 per 1,000 inhabitants; Figure 5). With the lifting of intercantonal mobility restrictions in the 1870s, the overseas emigration rate temporarily converged toward a lower (albeit increasing) level of net internal migration to Zurich. However, during the 1880s European crisis, departures to the Americas were again largely dominant over internal movements (3.5 vs. 1.0 per 1,000). The correlation coefficient between the 1860–1900 levels of net migration to Zurich and to the Americas is –0.45, but it is not statistically significant due to the limited number of intercensal estimates. Nevertheless, this moderate inverse association between the domestic and international rural exoduses of Switzerland points toward the substitutability of the two flows.

Figure 5. Crude annual intercensal rates of net out-migration to Zurich, emigration overseas from the main Swiss cantons sending migrants to Zurich, 1836–1949
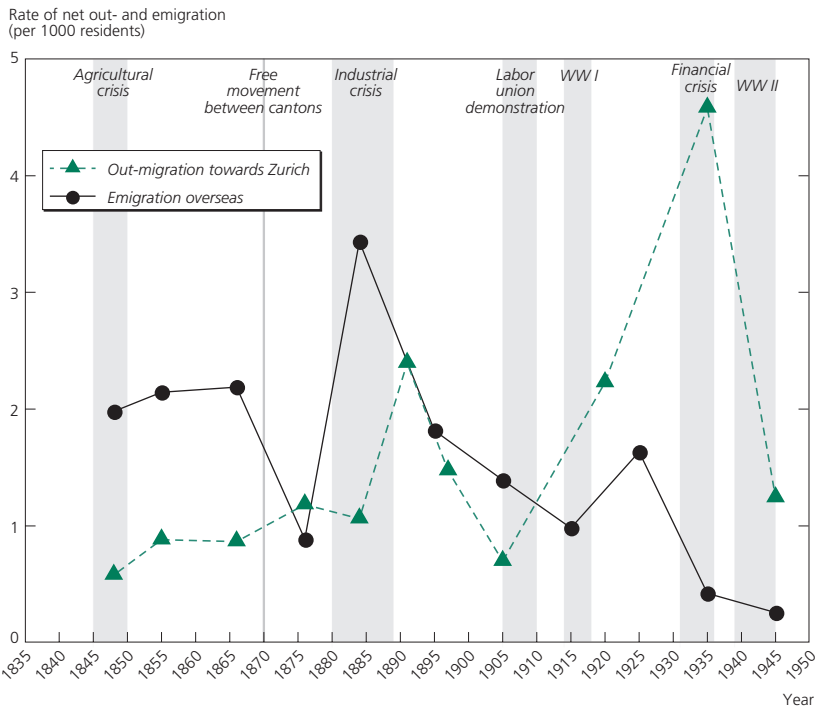
Notes: Values above 0 correspond to out-migration exceeding in-migration; at-risk populations are inhabitants of the Swiss cantons Uri, Schwyz, Unterwalden, Zug, Basel, Schaffhausen, St.Gallen, Graubünden, Argau, and Thurgau.
Sources: Statistisches Amt der Stadt Zürich Yearbooks (1909–1949), Historical Statistics of Switzerland (2021); indirect estimates by author.

Let us resume our description of Zurich's migration history. Unlike the case of net internal migration, the international migration balance was negative in the second quarter of the 19th century (between –0.2% and –0.1%, depending on the scenario regarding foreigners' natural increase; Figure 4). However, the rate increased dramatically to 0.4%–0.5% in the 1850s and to 0.7%–0.8% in the 1870s.[8] Migrants arrived mainly from France, where revolutions against the monarchy had failed, followed by larger numbers arriving later from Southern Germany until 1880. While Switzerland still experienced a negative international migration balance throughout the 19th century (Mayer, 1952), Zurich already constituted an important destination not only for refugees but also for foreign workers. The contribution of net international migration to the city's population growth thus already represented half of the contribution attributable to internal migration in the second half of the 19th century.

During the industrial crisis of the 1880s, net immigration temporarily collapsed to 0.3%, then recovered and skyrocketed to over 1.5% in the early 1890s. In this period, population growth was driven as much by international arrivals as by internal movements from the rest of Switzerland. Apart from industrial development, this immigration surge can be explained by Zurich becoming connected to the international railway system in the 1860s and by completion of the north–south tunnel under the Gotthard mountain range in the early 1880s. Concurrently, Italian workers progressively came to replace German immigrants (D'Amato, 2008).

Net international migration suddenly dropped threefold to less than 0.5% in the mid-1890s, which must be set in the social context of an economy marked by a structural crisis. Once electricity lines arrived in Zurich and industry became increasingly mechanized, traditional cotton manufacturers and crafts-men found themselves superseded, and popular resentment rose against the rapidly growing number of immigrants. This situation culminated in social riots against foreigners in general in 1893 and against Italians in particular in 1896 (D'Amato, 2008), thus driving many immigrants from the country.

2. 20th-century trends

From the 1890s onward, the data enable us to estimate separately the net migration of foreigners, local Swiss, and nonlocal Swiss, as well as to eliminate the confounding effects of changes in citizenship. While the 19th century was marked by important flows of international migration, Zurich's growth in the first half of the 20th century was essentially dominated by internal migration.

Although net internal migration of the nonlocal Swiss fluctuated greatly with ever more pronounced troughs and peaks (i.e., down to a quasi-balance of inflows and outflows during the First World War and up to 2.5% in the late

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(8) The net immigration rate relative to the at-risk population of foreigners was 3 times higher than the net migration rate among the Swiss (not shown).

1920s), the general trend is positive, as expected (Figure 4). This contrasts with a sharp decrease in overseas emigration from cantons serving as the main sources of internal migration to Zurich (Figure 5). The correlation coefficient between net overseas emigration and net internal migration to Zurich from the rest of Switzerland in 1900–1950 is –0.50; but, again, it is not statistically significant due to the low number of observations. This confirms the substitutability of domestic and foreign destinations for Swiss migrants.

The strong fluctuations of in-migration to Zurich may be related to the city's business cycle (Figure 4). Following a temporary drop in the 1900s, when labor unions launched large-scale demonstrations against increasingly mechanized industrial production, in-migration recovered during the First World War and fell again during the following economic crisis. With the improving economic situation of the late 1920s, migration from the rest of Switzerland peaked again, followed once more by a renewed decrease during the global financial crisis (which hit Switzerland in 1932–1935) and the early phase of the Second World War.

Compared to the 20th century's rising migration balance of nonlocal Swiss, net migration of local Swiss followed an inverse trend. The rate fell to negative levels in the 1890s (down to –0.3%), where it remained throughout later periods. One potential explanation is the changing composition of overseas migrants from Switzerland. Following the predominantly peasant settlements of the 19th century, the overseas numbers of opportunity-seeking urban industrial workers increased around the turn of the 20th century (Mayer, 1952; Holmes, 1988; Historical Statistics of Switzerland, 2021). During the First World War and the subsequent economic depression, net migration of Zurich's local citizens even dropped to nearly –1% in the early 1920s before stabilizing at around –0.1%. Another interpretation would favor residential moves from the city of Zurich to its rural outskirts, which became increasingly accessible with the development of intracity transportation networks. Unfortunately, the lack of more detailed data precludes a firm conclusion.

International migration of foreigners followed yet a different trend. Although the rate recovered after the immigrant pogroms of the 1890s, it collapsed to negative levels in 1912–1916 (–0.6%). Persistent anti-immigrant resentment and security concerns related to the First World War led to a restrictive immigration regime. Many young foreigners also left Switzerland to fight in their national armies (Mayer, 1952). Although the rate of international migration temporarily recovered with the arrival of war refugees, it reached a trough of –1% during the postwar economic depression. This coincided with the establishment of the Central Office of the Foreign Police, which increased control over border crossings (Ruedin et al., 2015).

As with internal migration, however, subsequent trends in international migration followed the business cycle: a shift to positive levels, peaking in the late 1920s, then negative levels during the global financial crisis and early

phase of the Second World War. Immediately after the war, the rate of international migration peaked at a fast pace to above 1%, bringing its contribution to Zurich's growth again up to par with that of internal migration. Our data cover only the initial years of when international migration increasingly dominated Zurich's growth until present periods (Rérat et al., 2008), similarly to other cities of Western Europe (Strozza et al., 2016).

VI. Natural increase by citizenship

Heterogeneity in the levels of natural increase of Zurich's population is shown in Figure 6. The trends according to citizenship (expressed as rates relative to Zurich's total at-risk population) are shaped mainly by variations in crude birth rates rather than death rates, which were similar and declined at a slow pace across all groups (not shown).

The natural increase of the Swiss population in Zurich turned positive by 1850. Following a 0.6% peak in the 1860s, the rate declined slightly in the last

Figure 6. Crude annual rates of natural increase by citizenship groups, Zurich, 1836–1949
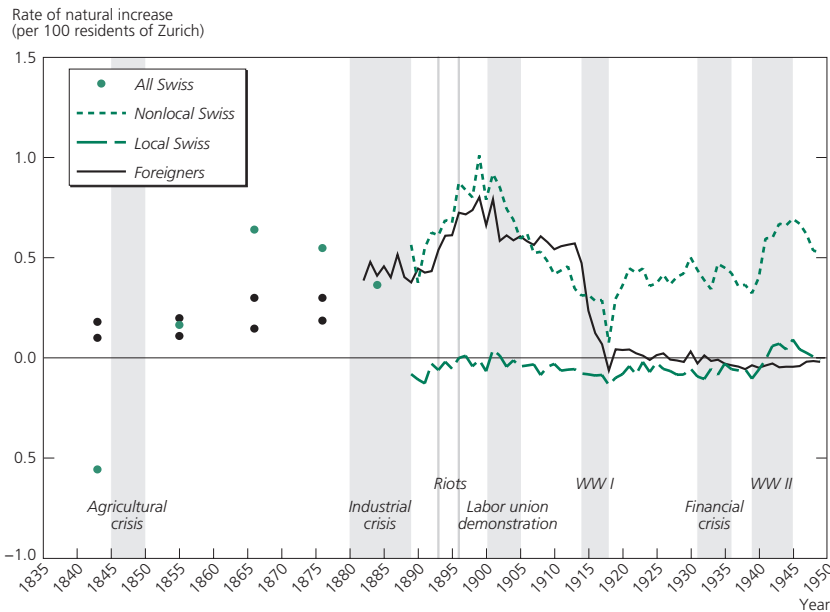
Notes: Lines indicate annual estimates; dots designate intercensal (residual) estimates. The two sets of intercensal estimates of foreigner's natural increase for 1836–1880 correspond to two different scenarios; the all-Swiss results (obtained by subtracting the natural increase attributable to foreigners from the total natural increase) do not significantly differ between these scenarios due to the larger Swiss population relative to foreigners.

Sources: Statistisches Amt der Stadt Zürich Yearbooks (1909–1949); Historical Statistics of Switzerland (2021); indirect estimates by author.

quarter of the century. However, as observed from 1890 onward, the levels and trends differ strongly among the local and nonlocal Swiss. On the one hand, our results confirm that the local Swiss completed their demographic transition by the end of the 19th century at the latest, since numbers of deaths slightly exceeded those of births over the entire observation period, with a −0.1% trough in natural population change during the First World War.

On the other hand, the natural increase of the nonlocal Swiss was high, tipping above 1% in the late 1890s and then progressively falling back to the initial level of 0.4% by 1910. Subsequent levels remained stable (except for the trough during the First World War) until the onset of the baby boom in the 1940s. The trend is similar among foreigners, with a peak at 0.8% at the turn of the 20th century. This signifies a high natural increase among foreigners when considering that they represented less than a third of the city's population.[9] However, the rate collapsed to slightly negative levels when young migrants massively left the country before the First World War, and it oscillated around 0% thereafter.

Interestingly, these peaks in the natural increase of migrant populations almost immediately followed a late 1880s and early 1890s surge in in-migration and immigration (compare Figures 4 and 6). This confirms the increasing selection of migrants from areas less advanced in the demographic transition (i.e., from increasingly remote areas of Switzerland and from Italy) as national and international transportation infrastructure improved. Compared to Zurich society, the newcomers of the late 19th century were indeed originally socialized in a demographic regime of earlier marriages and higher fertility: at least 67% of nonlocal and foreign single women in Zurich became married in 1893–1895, compared to only 45% among the local citizens, while the total marital fertility rate was, respectively, at least 9.4 against 6.6 children per woman (Statistisches Amt der Stadt Zürich, 1917). Together with the young age structure of migrants, this indirect behavioral effect of migration on fertility levels dominated Zurich's trend in natural increase.

VII. Discussion

City growth is commonly viewed as stemming from either births exceeding deaths during the demographic transition or from economic dynamics affecting rural-to-urban migration. In the contemporary world context of low fertility, increasing international migration flows to and from cities are attracting greater policy attention (International Organization for Migration, 2015). However, the evidence for contemporary and historical contexts remains scant. We have argued here in favor of taking into account international movements and mi-

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(9) Natural increase relative to the citizenship-specific at-risk populations was 3% for foreigners versus 2% for nonlocal Swiss (not shown).

grants' indirect contributions to urban natural increase, which will cultivate a better understanding of the role played by population mobility and broaden our perspective on city growth to the international arena. Using historical statistics, we could account for this diversity in the components of Zurich's population growth over more than a century.

The city essentially grew through migration flows. The positive natural increase resulted only from the indirect demographic contribution of migrants, confirming that the relative timing of when demographic and economic transitions begin is important to city growth patterns. As fertility decline preceded Zurich's industrialization period, the business cycle played a major role in population change by attracting migrants in periods of development and repulsing them during crises.

The geographical sources of migrants changed dramatically over time. While internal migrations dominated the first half of the 19th century, Swiss peasants started to massively move overseas rather than to Zurich in the second half of the century. This lost domestic growth potential was compensated for by a sharp increase in immigration from neighboring countries and by the migrants' high natural increase. Nevertheless, the growth pattern changed after the turn of the 20th century as immigration from Europe collapsed and Swiss emigration was redirected from overseas destinations back to domestic cities. Zurich's population growth once again became almost entirely dependent on internal migration. After the Second World War, however, international movements started to dominate the process once more. We cannot help but be intrigued by these shifts in the geographic sources of migrants over time, from mainly internal to international-and-internal over the 19th century, then back to predominantly internal before international sources became dominant from the mid-20th century onward. Why did Swiss peasants head predominantly overseas in the second half of the 19th century, even though Zurich's economy developed at a fast pace (except during the industrial crisis)? And why did they switch destinations to favor domestic cities at the turn of the 20th century? The high level of late 19th-century immigration also requires explanation. Particularly, why did the Germans move to Zurich instead of Baden-Württemberg's large industrializing cities? We believe that, relative to other regions, a city's timing and pattern of economic restructuring are the keys to understanding its population growth patterns.

As Zurich's economy became spatially concentrated and specialized in emerging sectors with high added value, peasants lost their agrarian and proto-industrial livelihoods. They also lacked the required skills and experience to work in the growing urban industry. Given Switzerland's emigration culture, peasants perceived greater opportunities abroad and pursued their third traditional source of income by migrating overseas to colonize land rather than adopt a new urban livelihood (Bergier, 1983; Arlettaz, 2000). Great Britain's economic crises also explain a similar redirection of rural-to-urban migrants

to overseas destinations (Thomas, 1973). Many migrants in several European countries may have been pushed overseas by cities restructuring their economic base and peasants thus preferring to maintain their agricultural livelihood rather than endure urban pauperization. The new skills needed for structurally transforming Zurich's industry were imported from neighboring countries, where factory workers were driven away by authoritarian governments and the more advanced technological development of industrial production when compared to Switzerland. Moreover, moving to the liberal and booming city of Zurich not only gave many residents in the south of Baden-Württemberg more political freedom, but the journey was also often shorter than heading toward the bigger industrial centers in their own region. This case study underlines the extent to which spatial proximity and spatial development inequalities can impact the migratory patterns of city growth.

Once the rail line and electrical grid arrived in the late 19th century, industry diversified and social life became more attractive in Zurich thanks to street lights, cinemas, and other amenities. The city invested in modernizing its sewage system and waste management, and it began to build large-scale social housing to improve the dire living conditions of the poor. These politically and technologically induced changes may have redirected Swiss emigrants from potential overseas destinations to the booming domestic city. Rising prices for agricultural land and new restrictions on immigration in the Americas also played a role at the turn of the 20th century (Holmes, 1988; Walter, 1995; Arlettaz, 2000). The revised Constitution of 1874 made schooling compulsory throughout Switzerland, which further provided the younger peasant generations with more skills to succeed in urban labor markets. Schooling may also have reduced religious conflict between Protestant Zurich and the predominantly Catholic surrounding region. While potential internal migrants may once have been reluctant to move to Zurich for religious reasons, this cultural barrier became less important within the newly secularized society. We argue that the modernization of, and welfare developments in, Swiss society played a key role in redirecting Swiss migrants to Zurich.

Politics and political freedom also play a role in city growth. The removal of legal barriers to mobility within Switzerland unleashed the potential of domestic migration, while European revolutions and wars in the second half of the 19th century drove refugees into liberal Swiss cities. However, after building the nation state, restrictions on international movements depressed subsequent flows of migration. These legal changes explain how Zurich transformed from an urban growth regime sustained significantly by international migration to one determined essentially by domestic movements. As the rural labor force started to decline and Switzerland assumed a leading role in Europe's economy after the Second World War, workers were again recruited from foreign countries.

This case study underlines the importance of looking beyond methodological nationalism when analyzing city growth. By taking account of both domestic

and international migration, we deepen our understanding of the role played by political forces and by a city's development trajectory within the international arena of competing migrant destinations. Our study also highlights the underappreciated role played by international movements in spreading modern development and urbanization processes across state borders, as has been argued in the context of migration between British cities and the Americas (Baines, 1985). The international redistribution of urban growth potential is even more important for contemporary cities, which are strongly and globally interlinked via modern communications and transportation technologies. Many city populations have dropped below replacement levels of fertility, not only in OECD countries and middle-income East and Southeast Asian countries (Liang et al., 2008; Guest, 2009), but also in low-income sub-Saharan African countries such as Ethiopia, in Addis Ababa (Gebreselassie, 2011). The growth patterns of these cities will be shaped by their economic fortunes and locations relative to border countries, as these are what determine the importance and geographical source of cityward migration.

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Mathias LERCH • INTERNATIONAL MIGRATION AND THE GROWTH OF ZURICH, 1836–1949

The role played by international migration and its interactions with other demographic components in the process of city growth remains underappreciated. We analyze trends in natural increase and in net internal and international migration in Zurich during the Industrial Revolution by relying on historical statistics disaggregated by citizenship and indirect demographic estimation techniques. Our results challenge demographic theories that attribute a predominant role to natural increase in city growth, finding that natural increase was positive only because of the migrants' contribution. Due to an early fertility decline, Zurich grew essentially through migration, with dramatic changes in the internal and international sources of migrants over time. Our discussion is centered in the context of structural changes in regional and international labor markets, and it further considers Zurich's discontinuous process of economic development and contrasting migration policies..

Mathias LERCH • MIGRATIONS INTERNATIONALES ET CROISSANCE DE LA VILLE DE ZURICH ENTRE 1836 ET 1949

Le rôle joué par les migrations internationales et leurs interactions avec d'autres composantes démographiques dans le processus de croissance urbaine demeure sous-estimé. Cet article évalue les tendances de l'accroissement naturel et des migrations nettes internes et internationales à Zurich pendant la révolution industrielle, en s'appuyant sur des statistiques historiques ventilées par nationalité et des techniques d'estimations démographiques indirectes. À rebours des théories démographiques sur le rôle prépondérant de l'accroissement naturel dans l'expansion de la ville, ces résultats montrent que l'accroissement naturel n'a été positif qu'en raison de l'apport migratoire. Dans un contexte de déclin précoce de la fécondité, Zurich s'est développée essentiellement sous l'effet des migrations, avec des variations considérables des origines internes et internationales des migrants au cours du temps. La discussion se concentre sur les évolutions structurelles des marchés du travail régional et international, et sur le processus discontinu du développement économique de Zurich et de ses politiques migratoires contrastées.

Mathias LERCH • MIGRACIONES INTERNACIONALES Y CRECIMIENTO DE LA CIUDAD DE ZURICH ENTRE 1836 Y 1949

Se subestima todavía el papel que han jugado las migraciones internacionales y su interacción con otros componentes demográficos en el crecimiento urbano. Este artículo evalúa las tendencias del crecimiento natural y de las migraciones netas, internas e internacionales, en Zurich durante la revolución industrial, apoyándose en estadísticas históricas ventiladas por nacionalidad y utilizando técnicas demográficas de estimation indirecta. Contrariamente a las teorías demográficas sobre el papel preponderante del crecimiento natural en la expansión de la ciudad, los resultados muestran que el crecimiento natural ha sido positivo solamente debido al aporte migratorio. En un contexto de disminución precoz de la fecundidad, Zurich se ha desarrollado esencialmente por el efecto de las migraciones, con variaciones muy importantes del origen interno o externo de los inmigrantes en el curso del tiempo. La discusión se concentra en la evolución estructural de los mercados del trabajo regional e internacional, así como en el proceso discontínuo de desarrollo económico de Zurich y de sus políticas migratorias contrastadas.