



# Urban exodus in Covid times

Who moves out of the inner city of Stockholm  
and where do they go?

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Stockholm  
University

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## Abstract

Since the outbreak of the COVID-19 pandemic, the media have abounded with stories of people “fleeing city-centres” and “finding refuge in the countryside”. A recurrent argument is that the shift towards teleworking has prompted individuals to reconsider their living situation and envisage the possibility of relocating further away from their workplace. The aim of this study is to examine the patterns and determinants of out-migration from the Stockholm inner city during the COVID-19 pandemic. We use Swedish register data and housing registers measured on 31 December each year to compare the trends for the first year of the COVID-19 pandemic (2020) and the five years preceding it (2015-2019). Our study shows that, similar to other large cities across the world, individuals moved out of the inner city of Stockholm to a higher degree in 2020 than during the years preceding the COVID-19 pandemic. The majority of movers relocated to the Stockholm suburbs, which experienced a substantial increase in the proportion of inflows from the Stockholm inner city. Yet a number of smaller municipalities, including traditional tourist destinations, also received in-movers from Stockholm in 2020. Although it remains to be seen whether the increase in out-migration from the Stockholm inner city observed in 2020 will be a long-term trend, the paper discusses the policy implications of inner city exodus, from the perspective of both the sending and the receiving locations.

**Keywords:** internal migration, suburbanisation, counterurbanisation, COVID-19 pandemic, Sweden

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## 1. Introduction

The COVID-19 pandemic has considerably affected societies across the world. Lockdowns and appeals to follow social distancing guidelines have induced a surge in teleworking. The wish to avoid contagion in densely populated cities has also brought about a reappraisal of nature and the outdoors. At the same time, the attractiveness of cities diminished as lockdowns and restrictions in social gatherings involved the shutdown of cultural and leisure amenities. All these social phenomena appear to have prompted an exodus from inner city areas. Trends of outflows from urban centres have been documented in a large number of cities. In North America, this is the case in New York, Boston, San Francisco, Los Angeles (The Economist, 2021, July), Toronto and Montreal among others (The Globe and Mail, 2021). In Europe, urban exodus has been observed in London (The Guardian, 2020), Paris (Le Monde, 2021), Oslo (Tønnessen, 2021) and Stockholm (Dagens Nyheter, 2021), as well as in large cities in the Netherlands (Klopper & Kooiman, 2021) and Spain (Gonzales-Leonardo & Lopez-Gay, 2021). There are also similar mobility patterns in Sydney, Melbourne (Wright & Duke, 2021), Beijing, Shanghai (Cheng, 2021) and Tokyo (Fielding & Ishikawa, 2021). A recurrent trend in many of these cities is that individuals tend to relocate in the suburban and peri-urban areas, staying relatively close to the inner city (The Economist, 2021, July).

The aim of this study is to examine the patterns and determinants of out-migration from the inner city of Sweden's capital, Stockholm, during the COVID-19 pandemic. It seeks to answer the following question: To what extent did individuals leave the Stockholm inner city in 2020, during the COVID-19 pandemic; where did they relocate to and what are the characteristics of these movers?

Mobility away from cities is not a new phenomenon. Since the 1970s, a rich body of literature has analysed counterurbanisation patterns in Sweden (Westlund, 2002; Hjort, 2005) and abroad (Berry, 1980). After many years of surplus in net domestic migration, the Stockholm municipality experienced a deficit in net domestic migration starting in 2014 (Statistics Sweden, 2022a). As the out-migration from the Stockholm inner city is not new, it is important to determine whether the phenomenon of urban exodus triggered by the COVID-19 pandemic differs from counter-urban migration patterns in pre-Covid times. Hence our second research question reads: To what extent and how do the patterns and determinants of out-migration from the Stockholm inner city differ between pre- and post-Covid periods?

To answer the research questions, the study applies descriptive and regression analysis to individual-level Swedish register data. We analyse residential mobility patterns in 2020, during the COVID-19 pandemic, and compare them with pre-pandemic patterns in the period 2015-2019. This study considers any type of moves away from metropolitan inner city areas. This allows us to study short-distance moves to the suburbs which may preserve individual's connection to the local labour market and social networks as well as counterurbanisation moves, where individuals move from metropolitan centres to medium-sized cities, small cities and rural areas.

## **2. Theory and previous research**

### **2.1 Counterurbanisation before the pandemic**

Counterurbanisation or the process of population deconcentration away from large urban settlements has been documented in a variety of countries, particularly since the 1970s (Mitchell & Bryant, 2009). It is considered to be driven by both social and economic factors. An important social factor is the growing attractiveness of the rural lifestyle. In relation to urban living, rural living is often associated with a better quality of life. In popular imaginations, the countryside involves open spaces, a healthy environment, safety, peacefulness and opportunities for recreation and socialisation (Ibid.; Hansen & Aner, 2017). Families with young children tend to have a stronger preference for rural living and are also more likely to undergo a counter-urban move (Andersen, 2011; Hansen & Aner, 2017). For some people, counterurbanisation can be driven by a desire for a more self-sufficient lifestyle, as in the so-called “back-to-the-land” movement (Halfacree, 2008). In addition, mobility away from urban areas often occurs in conjunction with individuals' retirement (Lundholm, 2015). Being close to family members is another common motive for counter-urban moves (Grimsrud, 2011).

Apart from social factors, the literature also points at economic motives for counterurbanisation. First, relative to large cities, smaller localities give access to more spacious and affordable housing. Counter-urban moves can thus be motivated by a need to reduce the costs of living (Andersen, 2011; Hansen & Aner, 2017). In Greece, for example, there has been a counterurbanisation trend during the financial crisis faced by the country in the early 2010s (Papadopoulos & Fratsea, 2020). Similar patterns were also documented in Spain (Oliva & Rivera, 2020) and Italy (Ebbreo, 2020). In addition, progress in information

and communication technologies have increased possibilities of teleworking in various occupations, giving workers more flexibility to choose their place of residence and work. It opens for the possibility of living and working in the countryside while having an employer or customers based in the city. In particular, workers in the creative and knowledge sectors (who are referred to as the “creative class”) are regarded as prone to undertake a counter-urban move (Herslund, 2012). Contrary to expectations, however, a Swedish study found that knowledge sector professionals did not have a higher likelihood of relocating from metropolitan areas to less densely populated regions. Instead, the probability of counter-urban migration was higher among public sector professionals, such as teachers, nurses and physicians, which are jobs that involve physical presence but which are in demand across the whole country (Sandow & Lundholm, 2020). Although counterurbanisation trends are not new, the COVID-19 pandemic has both exacerbated the existing factors and added new motives for urban exodus.

## **2.2 Counterurbanisation in times of COVID-19**

At the beginning of the COVID-19 pandemic, large internationally-connected cities such as London, Madrid, Milan and New York were particularly hit. Even in later stages of the pandemic, many large cities have been more severely affected than other regions (OECD, 2021). As it was the case during the Spanish flu pandemic of 1918-1919 (Frost, 2020), people who had the means to do so sought to escape contagion by moving away from densely populated cities. In many countries, people relocated to second homes in sparsely populated areas as a strategy for self-isolation (Pitkänen et al., 2020). At the same time, lockdowns and urges for social distancing have significantly decreased the attractiveness of large cities. As the cultural and entertainment industries shut down, a major asset of city life disappeared (Denham, 2021; Tønnessen, 2021).

In addition, the rise of teleworking during the pandemic has given many people the opportunity to leave cities, at least temporarily. Remote work from second homes in the countryside became a common trend in many countries (Pitkänen et al., 2020). In Sweden, a significant number of second homes have also been transformed into permanent dwellings (Swedish Association of Local Authorities and Regions, 2021). Since the outbreak of the pandemic, the prices of second homes and single-family detached homes have also significantly increased (Statistics Sweden, 2021b).

The rise of teleworking also gave a renewed importance to the home. As people spent both their working time and their leisure time at home, their housing needs evolved. Many people wished for more space, particularly office space. Gardens also became increasingly popular. A survey by the largest platform for housing search in Sweden shows that the pandemic has influenced individuals' housing preferences. Compared to the previous year, individuals in 2021 give a greater value to home offices, floor area and gardens (Hemnet, 2021). People also became more sensitive to their home surroundings and the proximity to green areas gained in appeal (Löhmus et al., 2021). Pandemic-related changes in residential preferences imply an increased demand for spacious detached houses located outside urban centres. Such houses are more affordable in suburban and rural areas.

The expansion of teleworking during the peak of the pandemic also reshaped people's views and preferences regarding their work-life balance. It revealed that many working activities could be done virtually and remotely and that alternative to lengthy daily commuting to the workplace was possible. It is therefore reasonable to expect that many working places will change their routines and adopt part-time teleworking as a permanent practice. Many public and private employers have already been planning for "hybrid work" after the pandemic (The Economist, 2021, October). The continuation of teleworking is also favoured by employees. A survey carried out by the Swedish Internet Foundation found that 89% of workers who worked remotely during the pandemic would like to continue working remotely at least sometimes in the future, and 45% said that they would like to carry out at least half of their work remotely (Internetstiftelsen, 2020). More flexible working conditions can have major consequences for residential patterns. If individuals only need to be at their workplace twice or three times per week, they may be willing to commute over longer distances. This opens up the possibilities for moving away from the city-centre and relocating to the suburban or peri-urban areas (Denham, 2020).

### **2.3 Empirical evidence of migration shifts during the COVID-19 pandemic**

At the time of writing, the number of published academic papers about mobility patterns during the COVID-19 pandemic is still low. However, there is some empirical evidence based on policy reports and media articles. A general trend that can be distinguished across several countries is that individuals leaving city-centres tend to relocate in the suburban and peri-urban areas. Hence, they remain within the broad city region, at commuting distance from the city-centre. This trend was documented by an "exodus index" constructed by The

Economist using Google data on visits to sites of retail and recreation, public transport and workplaces. It showed that the pandemic shifted economic activity from the inner city to the suburbs in cities such as Paris, London, Tokyo and New York (The Economist, 2021, September).

In the United States, urban exodus from urban centres overwhelmingly took place in large metropolitan cities, notably New York, San Francisco, Los Angeles and Boston. The main destinations of inner city leavers are towns and suburbs in proximity to large metropolitan cores (Kolko et al., 2021; The Economist, 2021, December). This is reflected by the fact that rents decreased in the New York core area, while they increased in the city suburbs (Gupta et al., 2021). Interestingly, small American cities did not witness similar population outflows.

In Japan, a study comparing internal migration patterns before and during the COVID-19 pandemic found that the Tokyo prefecture shifted from showing a positive trend in 2019 to experiencing a net migration loss in 2020 (Fielding & Ishikawa, 2021). The analysis of the destination of the flows from Tokyo revealed that some out-migrants from Tokyo relocated to nearby prefectures within the Greater Tokyo Metropolitan Region (e.g. Chiba and Kanagawa). Others moved further away, for example to the touristic and mountainous prefecture of Nagano where Tokiotes have traditionally owned second homes. Finally, some moved to more remote rural regions in Western Japan, which were not so attractive to in-migrants before the pandemic.

In the Netherlands, the pandemic also induced an outflow of people from the so-called Randstad, a large metropolitan region including the country's four biggest cities: Amsterdam, Rotterdam, Den Haag and Utrecht (Klopper & Kooiman, 2021). Between April and December 2020, more people moved out of the Randstad to other Dutch regions than in the reverse direction. An important proportion of out-movers from the Randstad settled in peripheral municipalities. Almost 70% of those leaving the city of Amsterdam settled in a municipality, Almere, which lies within the Greater Metropolitan Amsterdam Region. This flow can thus be characterised as a form of suburbanisation. Additionally, a significant proportion of out-movers from the Randstad relocated to more remote rural municipalities.

In Spain, out-migration from cities increased in 2020, compared to the four years preceding the pandemic, especially from Madrid and Barcelona. Rural areas also saw an increase in in-migration from cities. At the same time, in-migration to cities decreased. However, internal migration flows between and within urban areas remained the dominant pattern in 2020, as it was the case before the pandemic (Gonzalez-Leonardo et al., 2022).

In Norway, the vast majority of out-movers from Oslo during the first year of the pandemic settled in Viken, a large neighbouring county that surrounds Oslo (Tønnessen, 2021). This implies that suburbanisation was the dominant trend. Those who moved away from the city in 2020 were somewhat older than those who moved away in the period 2016-2019; they were also more often born outside Oslo. Finally, individuals with occupations that could be performed remotely were overrepresented among movers.

In Sweden, the governmental agency producing official statistics revised downwards its population forecasts for many municipalities in 2021, especially for metropolitan cities, medium-sized cities, and rural municipalities. At the same time, municipalities within commuting distance from cities have grown during the pandemic. Finally, there is a population increase in touristic municipalities as many have registered their permanent address in their second home (Swedish Association of Local Authorities and Regions, 2021).

### **3. COVID-19 in Sweden**

Since its outbreak in February 2020, the COVID-19 pandemic has claimed over 15,000 lives in Sweden (Statistics Sweden, 2020). Contrary to many other countries, Sweden did not impose mandatory lockdowns and kept most sectors of the society open, although at times the government imposed limits on the number of people that could congregate at public organised events. At the height of the pandemic, high schools and universities were closed, with teaching being held online (SOU 2021:89). The Swedish Public Health Agency issued a number of recommendations which had a large impact on daily lives of the Swedish population. Among other things, it issued a recommendation for those who can work remotely to do so, to stay at home at the slightest symptoms of illness, to avoid unnecessary travelling, to keep social distance and to as much as possible avoid interacting with the elderly.

Throughout the pandemic, the most affected groups included the elderly, individuals with lower socioeconomic status and those with pre-existing medical conditions (Brandén et al., 2020; Drefahl et al., 2020; Rostila et al., 2021). Another pattern was a large overrepresentation of the foreign-born among those suffering from COVID-19. This difference declined only slightly after controlling for economic deprivation or integration into Swedish society (Aradhya et al., 2021; Rostila et al., 2021). Another venue of research was occupational risks, with some reports indicating that certain occupations such as bus driver



and taxi chauffeurs or healthcare personnel had elevated risks of contracting COVID-19 (SOU 2021:89). However, others concluded that occupational exposure alone was not linked to higher risk of dying from COVID-19 (Billingsey et al., 2021). Researchers also observed that COVID-19 spread most in metropolitan areas, especially in the Stockholm region where the life expectancy decreased the most. Population density at the neighbourhood level and housing overcrowding were both associated with higher mortality from the disease (Andersson et al., 2021; Brandén et al., 2020). As in other cities (see e.g. Nathan, 2021), deprived and minority-dense neighbourhoods in Stockholm were hit severely by the pandemic (Sigurjónsdóttir et al., 2021; Florida & Mellander, 2021).

#### **4. Data and methods**

This study applied descriptive and multinomial logistic regression analysis to individual-level Swedish register data, including socioeconomic and demographic variables. In our dataset, individuals' residential location was measured by their municipality of residence on 31 December each year. We analysed mobility patterns in 2020, during the COVID-19 pandemic, and compared them with pre-pandemic patterns in the period 2015-2019. We excluded individuals for whom the origin and destination municipality was missing from the registers in a given year. In practice this means that we excluded international immigrants coming to Sweden and emigrants moving abroad. The changes in international migration flows related to the COVID-19 pandemic and their effects on population dynamics in Swedish municipalities deserve close examination, but they are outside the scope of this paper.<sup>1</sup>

In order to categorise municipalities, we used the classification of municipalities by the Swedish Association of Local Authorities and Regions (SALAR) and Statistics Sweden' classification of Labour Market Areas (LMAs). We drew on the 2017 SALAR classification in order to distinguish the following municipality types: 1. Metro-inner city (corresponding to the inner city of Sweden's three metropolitan regions—Stockholm, Gothenburg and Malmö); 2. Metro-suburbs (the commuting municipalities in the metropolitan area); 3. Medium-sized city (including their surrounding municipalities); 4. Small city/rural area. In order to capture the suburban municipalities for the three metropolitan cities, we used the 2020 LMA classification. LMAs are annually constructed by Statistics Sweden taking into account

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<sup>1</sup> Regarding international mobility in times of COVID-19, see Martin & Bergmann (2021).

commuting patterns. All municipalities that fall within the three metropolitan LMAs apart from the central metropolitan municipalities were assigned to the category “Metro-suburbs” in our study, irrespective of their category in the SALAR classification. For example, the municipalities of Uppsala and Södertälje, which were classified as medium-sized cities in the SALAR classification, were considered as Metro-suburbs in our study because they fall within the broader Stockholm LMA.

We explored the determinants of out-migration from the Stockholm inner city using multinomial logistic regression analysis, which is suitable for nominal outcome variables, such as movers’ types of destination. We limit our analysis to individuals aged 25 and older, thereby leaving out young people who tend to move temporarily for study purposes. Our study sample consists of 883,040 individuals who resided in the Stockholm municipality (In Swedish “Stockholms stad”, hereafter “Stockholm inner city”) during the study period. Our models included a number of independent variables with information on demographic and socioeconomic characteristics of individuals. These comprise *Sex*, *Age groups* and *Civil status*, as well as *Place of Birth* which distinguishes between those born in the Stockholm region, those born elsewhere in Sweden and foreign-born individuals. The dummy variable *Young children* indicates if the person has a child that is 10 years old or younger in their household. *Education level* refers to the highest educational attainment of the individual. *For disposable income* we calculated quartiles based on disposable income of the whole Swedish population in a given year. We also had a dummy-variable indicating whether the person is *Self-employed* and a variable describing their *Occupation*. The former is based on “YrkStalln”, which indicates the employment situation in November each year. The latter was constructed based on the Swedish Standard Classification of Occupations 2012 (SSYK), which derives from the International Classification of Occupations 2008 by the International Labour Organization. We distinguish between the following occupations: knowledge professionals (including IT technicians, engineers and architects), arts and crafts, healthcare, other public services (including teachers, social workers and police officers) and hospitality (hotel and restaurants). All remaining occupations fall under the category “Other”. Finally, the category “No occupation/not registered” included the individuals who are not employed and those with missing information about their occupation.

**Table 1.** Descriptive statistics for independent variables in sample for 2015-2020.

| <b>Variable</b>                   | <b>Category</b>              | <b>Frequency</b> | <b>Proportion</b> |
|-----------------------------------|------------------------------|------------------|-------------------|
| <i>Sex</i>                        | Male                         | 1 964 229        | 0.49              |
|                                   | Female                       | 2 060 013        | 0.51              |
| <i>Birthplace</i>                 | Stockholm region             | 1 662 201        | 0.41              |
|                                   | Rest of Sweden               | 1 208 435        | 0.30              |
|                                   | Outside Sweden               | 1 153 606        | 0.29              |
| <i>Age group</i>                  | 25-39                        | 1 505 577        | 0.37              |
|                                   | 40-54                        | 1 122 781        | 0.28              |
|                                   | 55-64                        | 600 223          | 0.15              |
|                                   | 65+                          | 795 661          | 0.20              |
| <i>Education level</i>            | Primary                      | 440 750          | 0.11              |
|                                   | Secondary                    | 1 541 551        | 0.38              |
|                                   | Tertiary                     | 1 933 461        | 0.48              |
|                                   | Unknown                      | 108 480          | 0.03              |
| <i>Disposable income</i>          | 1st quartile (lowest)        | 625 936          | 0.16              |
|                                   | 2nd quartile                 | 792 894          | 0.20              |
|                                   | 3rd quartile                 | 938 795          | 0.23              |
|                                   | 4th quartile (highest)       | 1 666 617        | 0.41              |
| <i>Young children (aged 0-10)</i> | No                           | 3 169 673        | 0.79              |
|                                   | Yes                          | 854 569          | 0.21              |
| <i>Civil status</i>               | Single/divorced/widowed      | 2 481 008        | 0.62              |
|                                   | Married/partnered            | 1 543 234        | 0.38              |
| <i>Self-employed</i>              | No                           | 3 785 983        | 0.94              |
|                                   | Yes                          | 238 259          | 0.06              |
| <i>Occupation</i>                 | Knowledge                    | 218 721          | 0.05              |
|                                   | Healthcare                   | 88 503           | 0.02              |
|                                   | Other public service         | 142 114          | 0.04              |
|                                   | Arts & Crafts                | 51 906           | 0.01              |
|                                   | Hospitality                  | 48 922           | 0.01              |
|                                   | Other                        | 1 886 022        | 0.47              |
|                                   | No occupation/not registered | 1 588 054        | 0.39              |
| <i>Year</i>                       | 2015                         | 644 296          | 0.16              |
|                                   | 2016                         | 654 822          | 0.16              |
|                                   | 2017                         | 665 471          | 0.17              |
|                                   | 2018                         | 676 909          | 0.17              |
|                                   | 2019                         | 686 774          | 0.17              |
|                                   | 2020                         | 695 970          | 0.17              |
| <b>Total</b>                      |                              | <b>4 024 242</b> | <b>1.00</b>       |

Table 1 is the frequency table of the independent variables in the sample. About 40% of the individuals in the sample were born in Stockholm County, 30% were born elsewhere in Sweden and 29% were foreign-born. About a fifth were parents to young children. 37% of the individuals in the sample were between 25 and 39 years old and half of them had a tertiary education. 6% were self-employed 39% had no occupation or no registered occupation.<sup>2</sup>

## 5. Results

### 5.1 Patterns of internal migration before and during the COVID-19 pandemic

First, we examined the patterns of internal migration before and during the COVID-19 pandemic according to municipality types. Figure 1 shows the in-migration, out-migration and net migration trends for the four types of municipality: metro inner city, metro-suburb, large city and small city/rural. For all four municipality-types, the direction of net migration patterns is the same before and after the outbreak of the pandemic. Metropolitan and small city/rural municipalities experienced a net migration deficit both in 2015-2019 and in 2020. This means that there are fewer people who moved into those municipality-types from other Swedish municipalities than people who relocated from them to the rest of Sweden. In contrast, suburban metropolitan municipalities and medium-sized city municipalities experienced net migration gains, both in the period 2015-2019 and in 2020, meaning that more people moved into those municipality-types from the rest of Sweden than people who moved in the opposite direction.

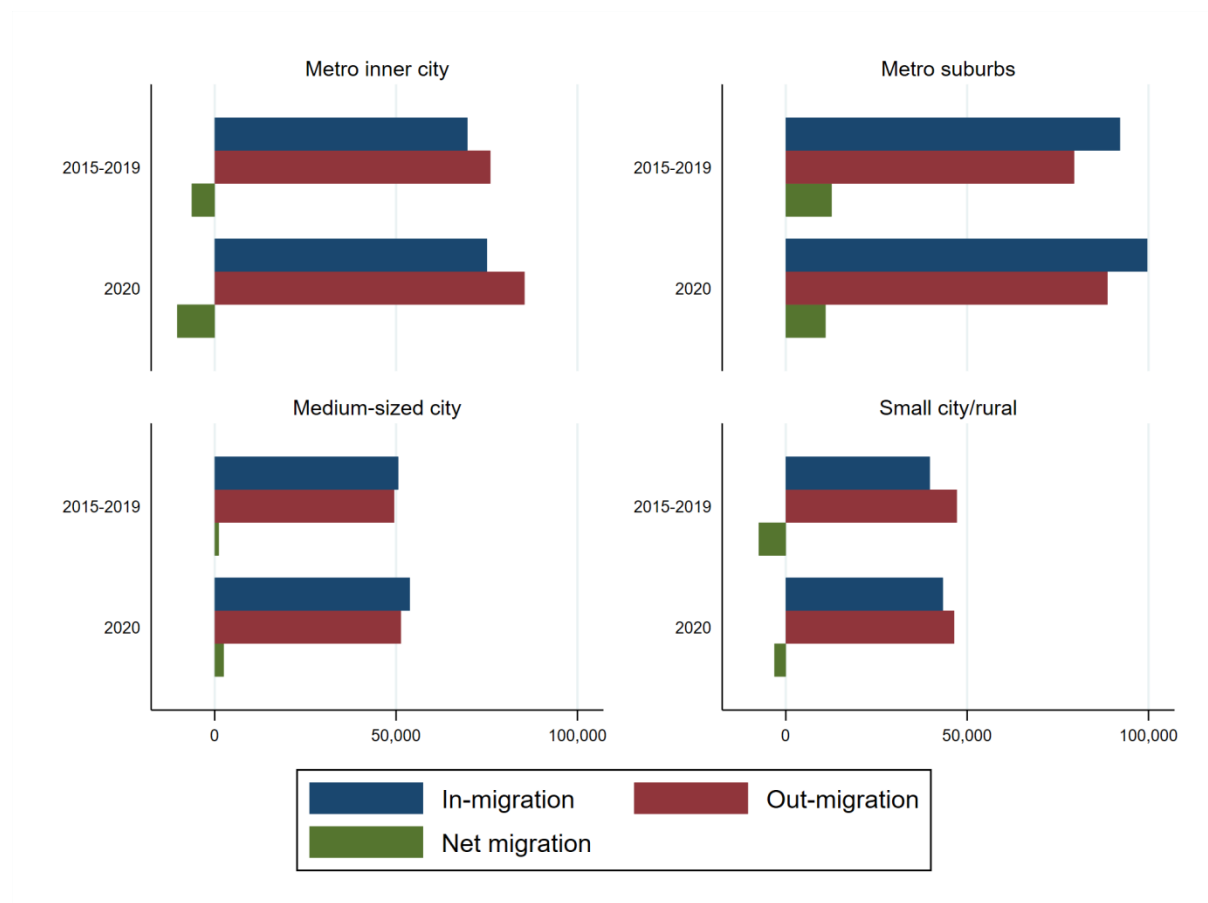
However, some changes in internal migration trends can be distinguished in 2020 compared to the years preceding the pandemic. First, the negative trend in net internal migration shown by metro-inner city municipalities was more severe in 2020. This means that these municipalities lost more people for the benefit of the rest of the country relative to the average for the period 2015-2019. Second, the negative net migration trend shown for small city/rural municipalities was milder in 2020 compared to the period 2015-2019. This

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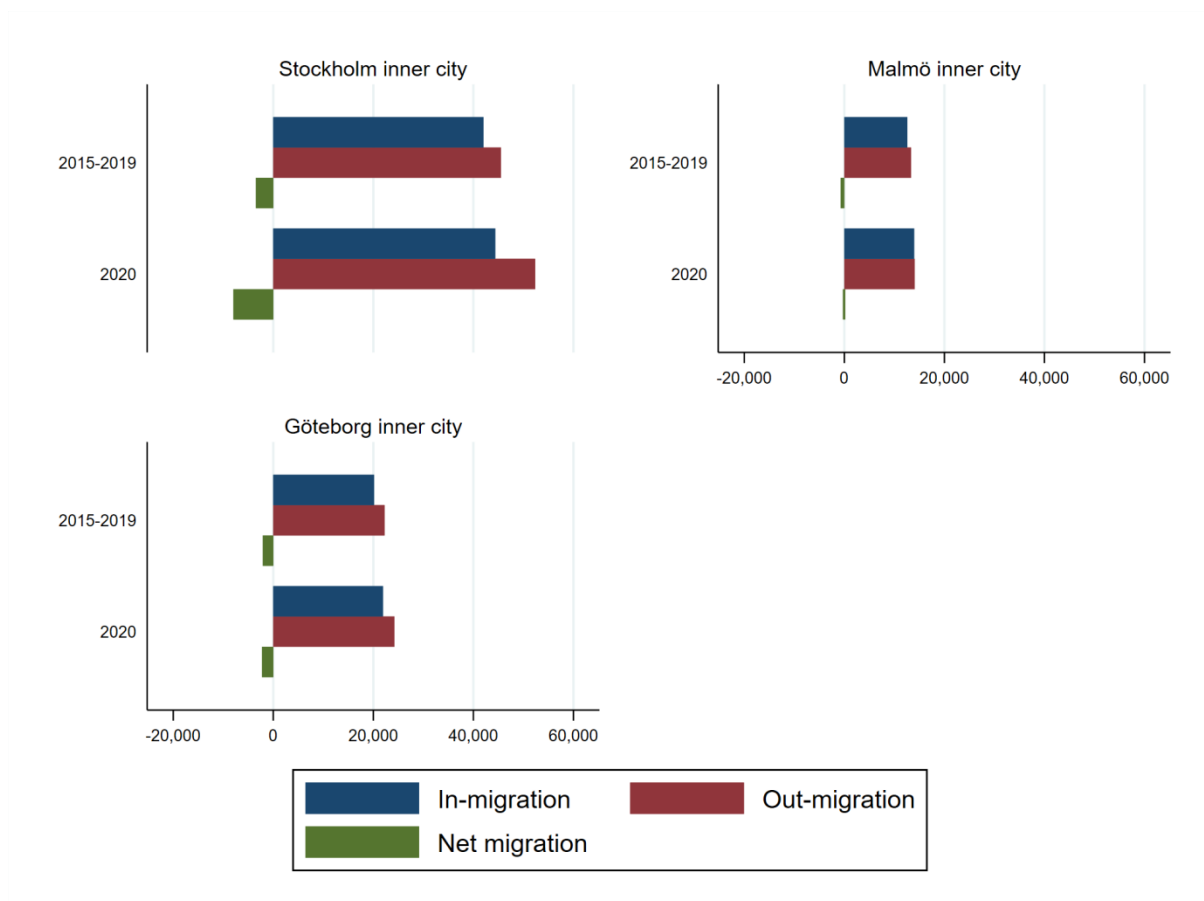
<sup>2</sup> More detailed descriptives by type of destination are presented on Table A2 in the Appendix.

type of municipalities thus lost fewer people due to an internal relocation within Sweden than they did prior to the pandemic.

After analysing metropolitan inner city areas as a single category in Figure 1, we examine the three central metropolitan municipalities—Stockholm, Gothenburg and Malmö—separately. Figure 2 shows that net internal migration was negative for all three metropolitan municipalities already in the period 2015-2019, although the negative trend was more pronounced for the Stockholm municipality (inner city). The net migration trend of the Stockholm inner city became even more negative in 2020 during the COVID-19 pandemic. Interestingly, we do not observe quite the same pattern of increased negative net internal migration in 2020 for the other two central metropolitan municipalities. In terms of absolute numbers, the Stockholm inner city lost an average of 3485 residents annually between 2015-2019 (due to internal migration) and 7947 residents in 2020. For Malmö municipality (inner city) the corresponding figures were 742 in 2015-2019 and 100 in 2020 and for Gothenburg municipality (inner city) 2093 in 2015-2019 and 2261 in 2020.



**Figure 1.** Migration trends by municipality type and period.



**Figure 2.** Migration trends by metropolitan municipality and period.

## 5.2 Destination of out-migration from the Stockholm inner city

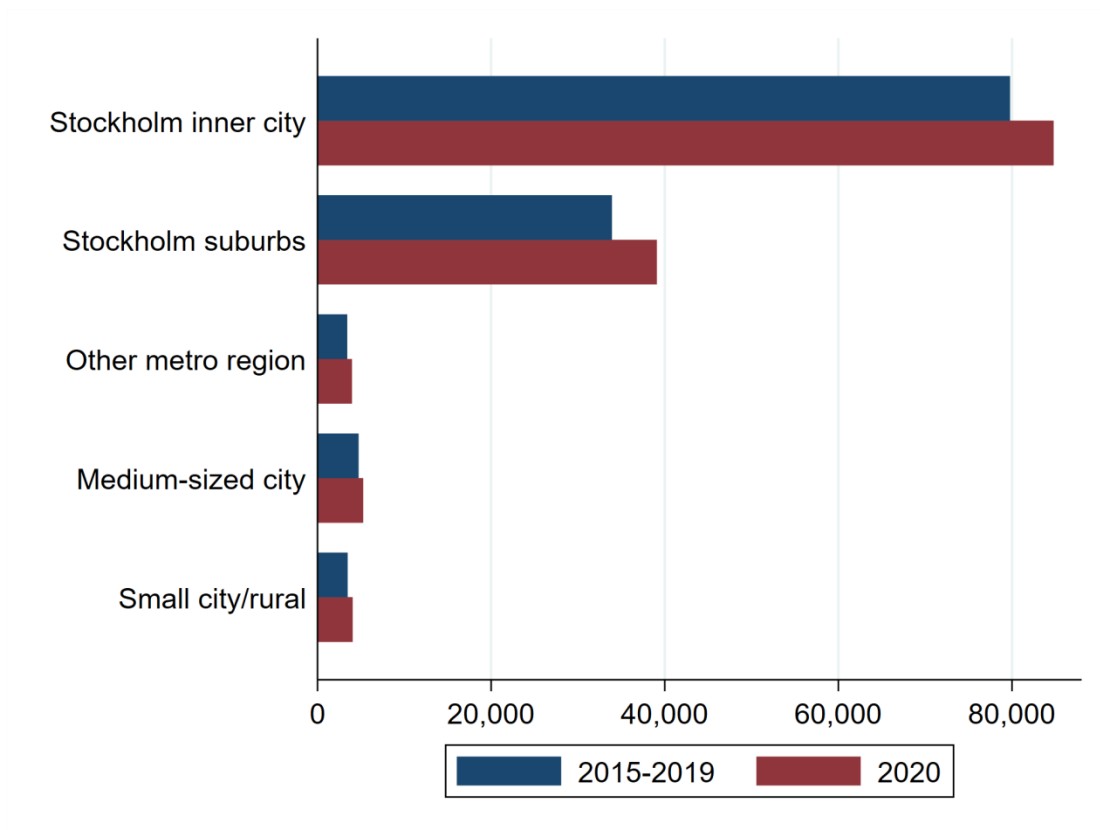
After examining the changes in internal migration trends, we turn to the destinations of the out-movers from the Stockholm inner city. Figure 3 shows the destination of out-movers from the Stockholm inner city in absolute numbers, for the periods 2015-2019 and 2020. Among those who moved, the vast majority of people relocated within the same municipality. There are some differences in the frequencies of moves to the five types of municipality of destination before and during the pandemic. We can see a clear increase in the number of individuals moving within the Stockholm inner city in 2020. Interestingly, we also observe a significant increase in the number of people who moved from Stockholm inner city to the suburbs. In 2020, 3785 more individuals underwent such a residential move compared to the average number in the years 2015-2019. Finally, there have also been some, albeit more moderate, increases in the numbers of people who moved to other metropolitan areas, medium-sized cities and small city/rural areas (see Table A1 in the Appendix).

In order to find out whether some types of moves became more prominent in 2020, Figure 4 depicts the destinations of out-migrants from the Stockholm inner city in terms of proportions. It shows a pronounced decrease in the proportion of moves within the Stockholm inner city between the periods 2015-2019 and 2020, while higher proportions of those who moved chose other types of destinations, notably the Stockholm suburbs. The reason why we observe a decrease in the *proportion* of moves within the Stockholm inner city despite the increase in the *number* of such moves (see Figure 3) is that the size of the population in the Stockholm inner city was larger in 2019 (which is the reference year for the individuals who moved in 2020) compared to the average population in the period 2014-2018 (the years of reference for those who moved in the period 2015-2019).<sup>3</sup> A larger population implies that even if the count of intra-Stockholm inner city movers increased in 2020, its proportion relative to the Stockholm inner city population (in 2019) was smaller than that of similar moves for the period 2015-2019.

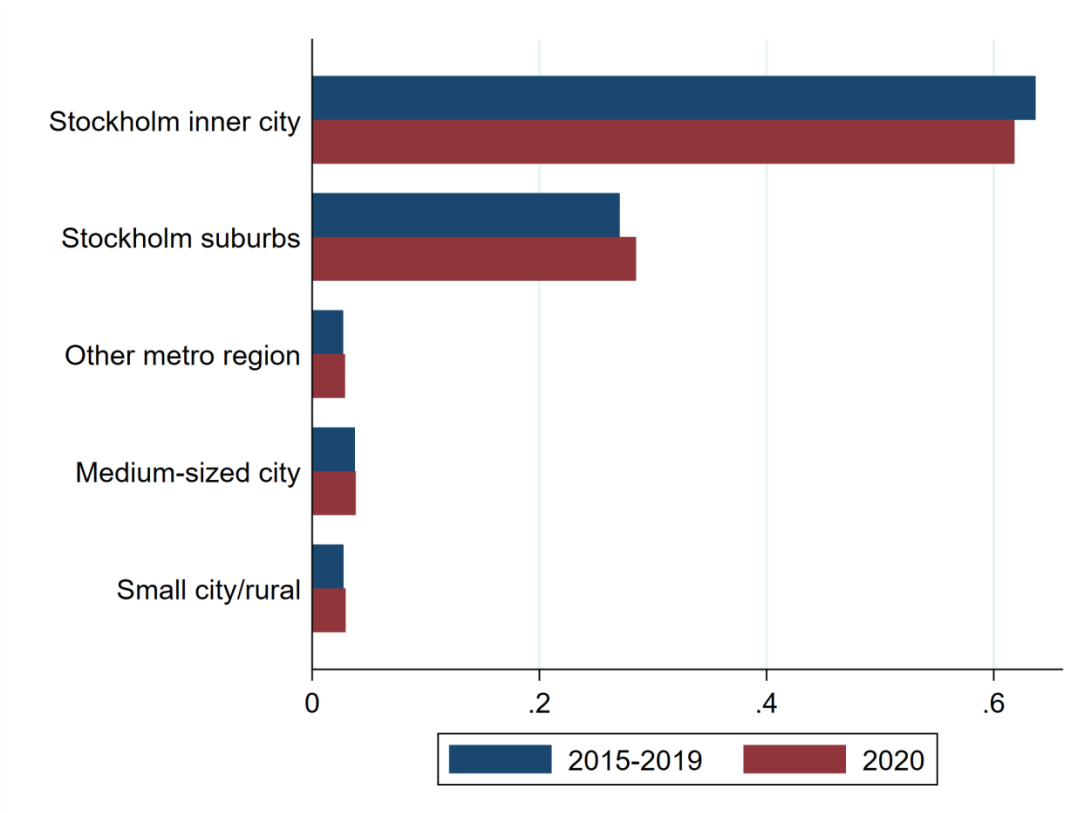
Figure 5 illustrates the differences in the flows from the Stockholm inner city to the five different types of municipality of destination in terms of proportions. The type of destination with the largest increase was Stockholm-suburbs (+1.43%), followed by Small city/rural (+0.19%), Other metro regions (+0.16%) and Medium-sized city (+0.06%). In short, the COVID-19 pandemic coincided with an increase in suburbanisation moves, but also an increase in counter-urban moves, defined both in a narrow sense as moves to sparsely populated regions and in a broader sense as including moves to medium-sized cities.

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<sup>3</sup> During the period 2014 to 2019, the population of Stockholm municipality grew due to a net inflow of international migrants (which compensated for net internal migration losses). Note that in 2020, the municipality experienced a net migration deficit (including internal and international flows) for the first time since 1979 (Statistics Sweden, 2022a).

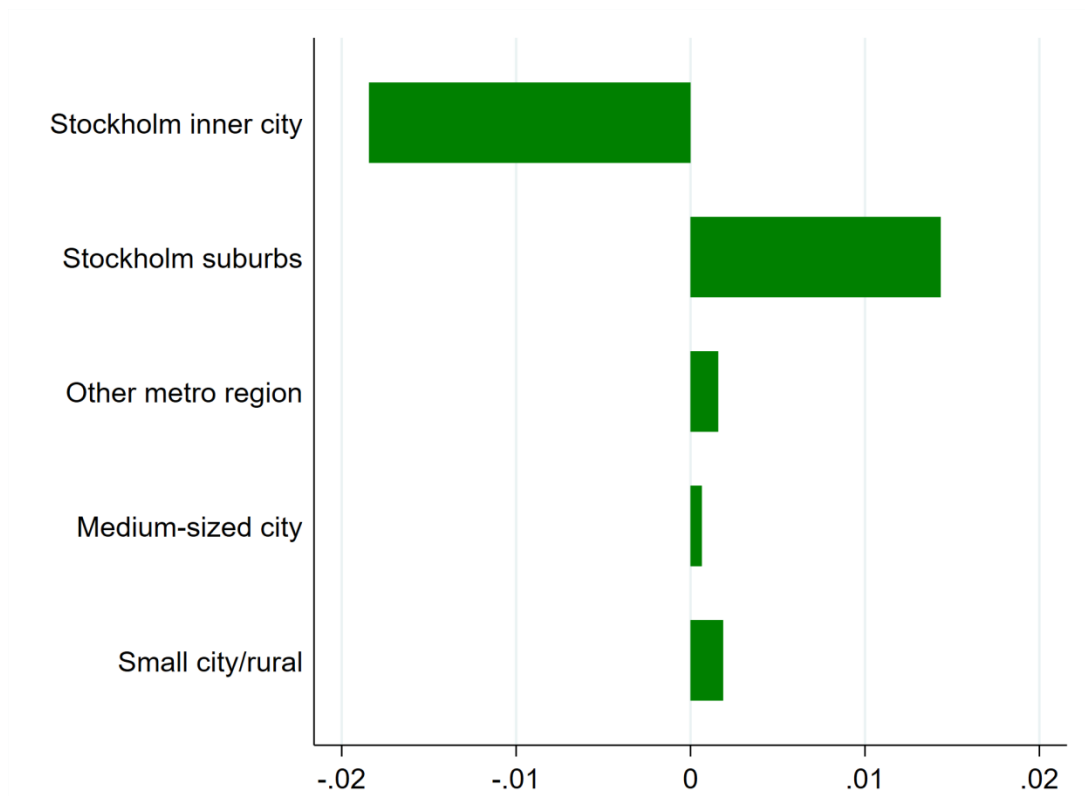


**Figure 3.** Flows from Stockholm inner city by destination, absolute numbers.



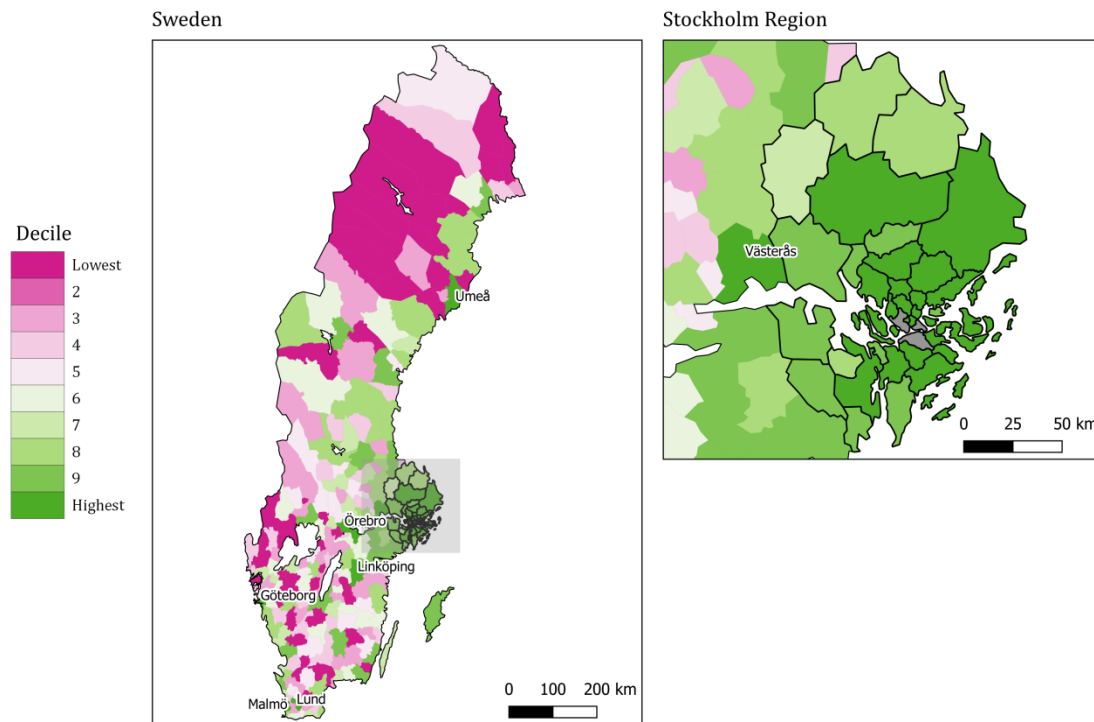
**Figure 4.** Flows from Stockholm inner city, proportions.



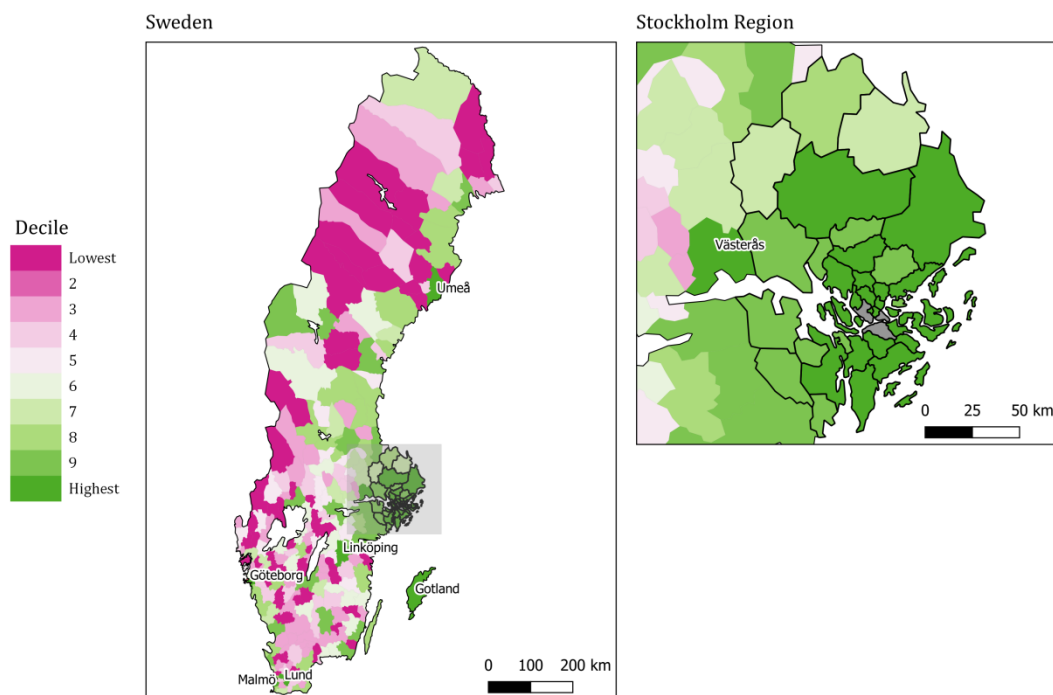


**Figure 5.** Differences in flows from the Stockholm inner city in terms of proportions between 2015-2019 and 2020.

We now present maps showing the proportions of moves from the Stockholm inner city by municipality of destination before (Figure 6) and during the COVID-19 pandemic (Figure 7). For clarity, the maps focus on the pool of people who moved out of the Stockholm inner city and show the percentages of this pool for each municipality inflow. As such, the maps illustrate which destinations are the least and the most popular among Stockholm inner city leavers. Labels are displayed for municipalities that are outside of the Stockholm Region and are in the top decile in terms of in-migration from the Stockholm inner city. An initial finding is that the main destinations of out-migrants from the Stockholm inner city were largely the same in 2020 as in the five years preceding the pandemic. It is clearly visible that the Stockholm suburbs are the principal recipients of the flows away from the Stockholm inner city. In 2020, the highest proportions of in-migrants from the inner city were directed to the suburban municipalities of Nacka and Huddinge. The next largest recipients are the metropolitan municipalities of Göteborg and Malmö. Other destinations include medium-sized cities such as Linköping, Västerås and Umeå. A number of smaller municipalities also stick out. These include traditional tourist destinations, such as the island of Gotland and the ski resort of Åre, as well as the small cities of Nyköping, Falun and Kalmar.



**Figure 6.** Migration from the Stockholm inner city between 2015-2019.



**Figure 7.** Migration from the Stockholm inner city in 2020.

### **5.3 Determinants of out-migration from the Stockholm inner city**

This section presents results from multinomial regression analysis of the different types of destinations for those who moved away from the Stockholm inner city. Our reference category includes staying in the Stockholm inner city or moving within the inner city. The regression tables 2 and 3 show how different demographic, socioeconomic and work-related variables were associated with different types of destinations. The estimates are expressed as relative risk ratios. Their interpretation is that for every one unit change in the independent variable, the relative risk of a given outcome relative to the reference category is expected to change by a factor of the parameter estimate given that all other variables in the model are held constant. We applied a two-step strategy. First, we estimated a model for 2020, the year when COVID-19 pandemic started in Sweden (Table 2). Second, we estimated the same model for 2015-2019 (Table 3) and compared the results with the 2020 model to find out to what extent the determinants of out-migration from the Stockholm inner city changed with the outset of the pandemic.

#### **5.3.1 Determinants of out-migration in 2020**

We start with demographic factors. Compared to individuals born in the Stockholm region, for those born elsewhere in Sweden the relative risk of moving to destinations outside of the Stockholm region are at least three times higher. The most striking result is that the relative risks of moving to another metro region were four times higher or more, but the relative risks are also high for medium-sized cities. This pattern is probably driven by the fact that those born elsewhere in Sweden have existing social networks in places other than the Stockholm region, which influences both a decision to move and the destination (Grimsrud, 2011). For foreign-born individuals the relative risks are not of quite the same magnitude as for those born in Sweden outside of the Stockholm region, but we observe that compared to staying in the Stockholm inner city, foreign-born people are more likely to move to the Stockholm suburbs, other metro regions and medium-sized cities, but not to small cities and rural municipalities, where the relative risks are smaller than 1. This suggests that compared to the Stockholm-born, foreign-born individuals tend to move out of the Stockholm inner city but also avoid the most sparsely populated municipalities.

**Table 2.** Determinants of out-migration from the Stockholm inner city in 2020.

| Destination (ref. staying in Stockholm inner city) |                               | Stockholm suburbs     | Other metro region    | Medium-sized city     | Small city & rural    |
|--|-------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|
|  |                               | <i>rrr</i>            | <i>Rrr</i>            | <i>rrr</i>            | <i>rrr</i>            |
| <i>Sex</i> (ref. Male)                             | Female                        | 0.863***<br>(-11.234) | 0.946<br>(-1.330)     | 0.825***<br>(-5.196)  | 0.888***<br>(-3.053)  |
|  | Rest of Sweden                | 1.018<br>(1.016)      | 4.500***<br>(28.586)  | 4.144***<br>(30.556)  | 2.697***<br>(22.349)  |
| <i>Birthplace</i> (ref. Stockholm region)          | Outside Sweden                | 1.620***<br>(31.005)  | 1.392***<br>(5.021)   | 1.495***<br>(7.281)   | 0.858***<br>(-2.678)  |
| <i>Age group</i> (ref. 25-39)                      | 40-54                         | 0.380***<br>(-58.761) | 0.289***<br>(-20.908) | 0.338***<br>(-21.115) | 0.481***<br>(-14.114) |
|  | 55-64                         | 0.222***<br>(-57.152) | 0.202***<br>(-18.552) | 0.335***<br>(-16.757) | 0.522***<br>(-10.416) |
|  | 65+                           | 0.129***<br>(-64.941) | 0.143***<br>(-21.956) | 0.179***<br>(-22.611) | 0.322***<br>(-16.491) |
|  |                               |                       |                       |                       |                       |
| <i>Education level</i> (ref. Primary)              | Secondary                     | 1.009<br>(0.358)      | 1.362***<br>(2.947)   | 0.851**<br>(-2.319)   | 1.002<br>(0.022)      |
|  | Tertiary                      | 0.918***<br>(-3.482)  | 1.822***<br>(5.794)   | 0.870**<br>(-2.001)   | 0.848**<br>(-2.235)   |
|  | Unknown                       | 1.409***<br>(10.177)  | 1.171<br>(0.951)      | 0.597***<br>(-3.811)  | 0.789*<br>(-1.648)    |
|  |                               |                       |                       |                       |                       |
| <i>Disposable income</i> (ref. 1st quartile)       | 2nd quartile                  | 1.165***<br>(6.875)   | 0.828***<br>(-2.757)  | 0.866**<br>(-2.505)   | 0.841***<br>(-2.819)  |
|  | 3rd quartile                  | 1.140***<br>(6.005)   | 0.687***<br>(-5.563)  | 0.673***<br>(-6.781)  | 0.723***<br>(-5.220)  |
|  | 4th quartile                  | 0.975<br>(-1.136)     | 0.569***<br>(-8.391)  | 0.427***<br>(-14.088) | 0.533***<br>(-9.981)  |
|  |                               |                       |                       |                       |                       |
| <i>Young children</i> (ref. No)                    | Yes                           | 0.928***<br>(-4.615)  | 0.680***<br>(-6.834)  | 0.890**<br>(-2.413)   | 0.906*<br>(-1.879)    |
|  |                               |                       |                       |                       |                       |
| <i>Civil status</i> (ref. Single/divorced/widowed) | Married/ partnership          | 1.131***<br>(8.167)   | 0.942<br>(-1.154)     | 0.997<br>(-0.069)     | 1.011<br>(0.236)      |
|  |                               |                       |                       |                       |                       |
| <i>Self-employed</i> (ref. No)                     | Yes                           | 0.986<br>(-0.661)     | 1.325***<br>(4.684)   | 1.296***<br>(4.928)   | 1.433***<br>(6.771)   |
|  |                               |                       |                       |                       |                       |
| <i>Occupation</i> (ref. Other)                     | Knowledge                     | 0.980<br>(-0.789)     | 0.886<br>(-1.491)     | 1.043<br>(0.568)      | 0.929<br>(-0.856)     |
|  | Healthcare                    | 0.938<br>(-1.399)     | 1.147<br>(1.105)      | 1.703***<br>(5.268)   | 1.859***<br>(5.805)   |
|  | Other public service          | 1.011<br>(0.326)      | 0.908<br>(-0.882)     | 1.130<br>(1.309)      | 1.276**<br>(2.497)    |
|  | Arts & Crafts                 | 0.578***<br>(-8.241)  | 1.069<br>(0.478)      | 0.758*<br>(-1.836)    | 0.985<br>(-0.100)     |
|  | Hospitality                   | 0.982<br>(-0.394)     | 1.221<br>(1.339)      | 1.001<br>(0.007)      | 1.021<br>(0.139)      |
|  | No occupation/ not registered | 0.903***<br>(-5.707)  | 1.021<br>(0.368)      | 0.895**<br>(-2.217)   | 1.127**<br>(2.346)    |
|  |                               |                       |                       |                       |                       |
| Pseudo R2  |                               |                       |                       | 0.0636                |                       |
| N  |                               |                       |                       | 695970                |                       |

*z* statistics in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.010$

Belonging to older age groups, as opposed to the reference group aged 25-39, is associated with a lower probability of moving out of the Stockholm inner city. This is not surprising given that the reference group consists of individuals who are at the most mobile period of their life (McCollum et al., 2020). With age people are generally less likely to move. Nevertheless, for those who do make a decision to move there are differences in respect to which destinations they consider. For instance, the relative risks are low especially for moving to the Stockholm suburbs, which seems to be a destination avoided by older age groups, while small city and rural municipalities seem to be most attractive, once a decision to move out of the inner city is taken.

For sex, the relative probability of moving to the Stockholm suburbs, medium-sized cities and small city and rural municipalities rather than staying in the Stockholm inner city is 10-15% lower for women than for men, controlling for other factors. Having young children is associated with lower relative probability of moving out of the inner city. This is in line with the fact that families with young children are generally less mobile (McCollum et al., 2020). But there are some differences in the types of destinations considered, once a decision to move out of the Stockholm inner city is taken<sup>4</sup>. The most likely is the move to the Stockholm suburbs and the least likely is a long distance move to another metro region. Interestingly, the estimated relative risks are higher for moving to small city and rural municipalities than for moving to a medium-sized city or another metro region. Being married or in civil partnership is associated with increased relative probability of moving to the Stockholm suburbs.

Next, we discuss the associations for socioeconomic variables. Having tertiary education, compared to primary education, is associated with a decrease in the relative probability of moving outside of the Stockholm inner city (with medium-sized cities being the most avoided type of municipalities), but also with higher relative probability of moving to another metro region. This is likely because labour markets in other metro regions are similar to Stockholm's labour market and therefore they are most appealing for individuals with higher levels of education. For disposable income, those in the highest quartile have lower relative risks of making any type of move away from the Stockholm region. This is in line with what has been shown about the remarkable concentration of high status individuals in metropolitan cities and especially in Stockholm (Kawalerowicz & Malmberg, 2021). When

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<sup>4</sup> These differences in the relative probability for a given destination choice, once a decision to move has been made, are also shown in Table A3 in the Appendix, where we focus just on a sample of those who moved their residential addresses, either within Stockholm inner city or to another municipality.

they do move, those with the highest disposable income tend to avoid medium-sized city municipalities, which is similar to a pattern we observed for the tertiary educated. For quartiles 2 and 3, the relative risks of moving to the Stockholm suburbs are above 1, suggesting that they are more likely, in comparison to those with the lowest disposable income, to make such a move.

Lastly, our findings indicate the importance of work-related characteristics. Individuals who are self-employed have increased chances of moving away from the Stockholm region. Interestingly, the effect is highest for relocating to small cities and rural municipalities. This could indicate that self-employed are more mobile and also more likely to make long distance moves. For occupations, we find that public sector workers in general are more likely to make counter-urban moves, compared to staying in the Stockholm inner city. This is particularly the case for healthcare workers, for whom the relative probability of moving to medium-sized cities, small cities and rural municipalities is 70-90% higher than the reference category. Finally, those working in arts and crafts occupations tend to avoid relocating to the Stockholm suburbs and, to a lesser extent, to medium-sized cities.

### 5.3.2 Differences in the determinants of out-migration before and during COVID

In this section we focus on differences between 2020 and the pre-Covid period of 2015-2019. By comparing Table 2 and Table 3, we see that for most variables the differences in relative ratios were not large. Where differences exist, they are rather small in magnitude and rarely change the direction of the association. Below, we will just present results where the confidence intervals for estimated relative ratios do not overlap for 2020 and 2015-2019. The most striking differences are observed for self-employment. For self-employed individuals the relative ratios of moving to medium-sized cities compared to staying in the Stockholm inner city changed the sign of the association. This means that before the pandemic self-employment was associated with lower relative probability of moving to medium-sized city municipalities, while in 2020 it was associated with higher relative probability. For Other metro region and Small city and rural municipality types the association was positive and statistically significant in 2020, but not in the pre-pandemic period. These results suggest that the pandemic may have provided an incentive for self-employed individuals to leave the Stockholm region.

Next, we see changes for age groups. Older age groups were more likely to move to small cities and rural areas and also to medium-sized cities in 2020 but this effect was smaller

in magnitude than for the period 2015-2019. Parents with young children have increased probability to move to suburbs but this difference is less pronounced in 2020. Moreover, we observe some period differences in respect to where a person was born. Compared to individuals born in the Stockholm region, those born elsewhere in Sweden had a higher relative probability of moving to small city/rural municipalities between 2015-2019, but the magnitude of this effect was smaller than in 2020. Based on the above results, it appears that several traditional factors of counterurbanisation have been attenuated in 2020.

Regarding socioeconomic variables, we observe some interesting patterns with respect to disposable income. Those in the second and third quartile of disposable income are even more likely to move to the Stockholm suburbs in 2020 than in the period of 2015-2019. Additionally, being in the top quartile for disposable income is not a significant predictor for moving to the Stockholm suburbs in 2020 but between 2015-2019 it was associated with a lower relative probability of making such a move. A higher disposable income is also associated with lower relative risk of moving to small city and rural municipalities for both periods but this effect is attenuated in 2020.

**Table 3.** Determinants of out-migration from the Stockholm inner city in 2015-2019.

| Destination (ref. staying in Stockholm inner city) |                  | Stockholm suburbs      | Other metro region    | Medium-sized city     | Small city & rural    |
|--|------------------|------------------------|-----------------------|-----------------------|-----------------------|
|  |                  | <i>rrr</i>             | <i>rrr</i>            | <i>rrr</i>            | <i>rrr</i>            |
| <i>Sex</i> (ref. Male)                             | Female           | 0.858***<br>(-24.221)  | 0.947***<br>(-2.770)  | 0.832***<br>(-10.377) | 0.810***<br>(-10.937) |
|  | Outside          |                        |                       |                       |                       |
| <i>Birthplace</i> (ref. Stockholm region)          | Stockholm region | 1.035***<br>(4.286)    | 4.402***<br>(58.886)  | 4.155***<br>(63.789)  | 3.167***<br>(51.361)  |
|  | Foreign-born     | 1.566***<br>(59.257)   | 1.381***<br>(10.268)  | 1.446***<br>(13.804)  | 0.919***<br>(-2.926)  |
| <i>Age group</i> (ref. 25-39)                      | 40-54            | 0.370***<br>(-124.868) | 0.280***<br>(-44.790) | 0.330***<br>(-45.913) | 0.451***<br>(-31.292) |
|  | 55-64            | 0.230***<br>(-115.908) | 0.197***<br>(-38.968) | 0.248***<br>(-40.139) | 0.458***<br>(-24.299) |
|  | 65+              | 0.125***<br>(-134.830) | 0.108***<br>(-48.964) | 0.130***<br>(-53.123) | 0.252***<br>(-38.606) |
|  |                  |                        |                       |                       |                       |
| <i>Education level</i> (ref. Primary)              | Secondary        | 1.053***<br>(4.583)    | 1.362***<br>(6.606)   | 0.942*<br>(-1.864)    | 1.007<br>(0.206)      |
|  | Tertiary         | 0.993<br>(-0.604)      | 1.791***<br>(12.638)  | 0.845***<br>(-5.166)  | 0.771***<br>(-7.545)  |
|  | Unknown          | 1.454***<br>(22.355)   | 1.296***<br>(3.422)   | 0.826***<br>(-3.254)  | 0.798***<br>(-3.230)  |

*Disposable income* (ref. 1st quartile)

|              |                       |                       |                       |                       |
|--------------|-----------------------|-----------------------|-----------------------|-----------------------|
| 2nd quartile | 1.039***<br>(3.588)   | 0.821***<br>(-6.231)  | 0.805***<br>(-7.882)  | 0.768***<br>(-8.962)  |
| 3rd quartile | 1.027***<br>(2.614)   | 0.602***<br>(-16.002) | 0.653***<br>(-15.479) | 0.598***<br>(-17.166) |
| 4th quartile | 0.901***<br>(-10.012) | 0.496***<br>(-22.371) | 0.432***<br>(-29.496) | 0.401***<br>(-29.690) |

*Young children* (ref. No)

|     |                      |                       |                      |                      |
|-----|----------------------|-----------------------|----------------------|----------------------|
| Yes | 0.938***<br>(-8.311) | 0.621***<br>(-17.626) | 0.844***<br>(-7.427) | 0.934***<br>(-2.668) |
|-----|----------------------|-----------------------|----------------------|----------------------|

*Civil status* (ref. Single/divorced/widowed)

|                         |                      |                     |                    |                      |
|-------------------------|----------------------|---------------------|--------------------|----------------------|
| Married/<br>partnership | 1.095***<br>(12.600) | 0.945**<br>(-2.272) | 0.965*<br>(-1.660) | 0.943***<br>(-2.581) |
|-------------------------|----------------------|---------------------|--------------------|----------------------|

*Self-employed* (ref. No)

|     |                      |                  |                      |                  |
|-----|----------------------|------------------|----------------------|------------------|
| Yes | 0.883***<br>(-7.330) | 1.032<br>(0.661) | 0.811***<br>(-4.496) | 1.055<br>(1.240) |
|-----|----------------------|------------------|----------------------|------------------|

*Occupation* (ref. Other)

|                                  |                       |                     |                      |                      |
|----------------------------------|-----------------------|---------------------|----------------------|----------------------|
| Knowledge                        | 0.963***<br>(-2.798)  | 0.960<br>(-0.966)   | 0.906**<br>(-2.374)  | 0.718***<br>(-6.281) |
| Healthcare                       | 0.936***<br>(-2.926)  | 1.222***<br>(3.293) | 1.689***<br>(10.006) | 1.846***<br>(10.660) |
| Other public<br>service          | 0.985<br>(-0.857)     | 0.935<br>(-1.261)   | 1.274***<br>(5.387)  | 1.448***<br>(7.677)  |
| Arts & Crafts                    | 0.617***<br>(-14.937) | 1.000<br>(-0.006)   | 0.676***<br>(-4.684) | 0.671***<br>(-4.443) |
| Hospitality                      | 0.977<br>(-0.956)     | 1.186**<br>(2.173)  | 1.005<br>(0.076)     | 1.092<br>(1.159)     |
| No occupation/<br>not registered | 0.934***<br>(-8.527)  | 1.087***<br>(3.347) | 1.097***<br>(4.142)  | 1.081***<br>(3.213)  |

*Year* (ref. 2015)

|      |                      |                   |                     |                     |
|------|----------------------|-------------------|---------------------|---------------------|
| 2016 | 0.962***<br>(-3.938) | 1.020<br>(0.651)  | 0.980<br>(-0.742)   | 1.042<br>(1.378)    |
| 2017 | 0.977**<br>(-2.411)  | 1.050<br>(1.569)  | 1.080***<br>(2.814) | 1.074**<br>(2.352)  |
| 2018 | 0.972***<br>(-2.882) | 1.060*<br>(1.880) | 1.098***<br>(3.418) | 1.081***<br>(2.586) |
| 2019 | 0.973***<br>(-2.821) | 1.045<br>(1.425)  | 1.048*<br>(1.678)   | 1.074**<br>(2.355)  |

|           |         |
|-----------|---------|
| Pseudo R2 | 0.0641  |
| N         | 3328272 |

z statistics in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.010$



## 5.4 Robustness checks

To test whether our results were affected by the way we defined the Stockholm inner city, we re-run the analysis but this time including the municipalities of Solna and Sundbyberg as part of the inner city. These municipalities are densely populated and somewhat encircled by the Stockholm municipality. This increased our sample to 990,731 individuals. Apart from some minor changes, there are no substantial differences to our results (see Table A3 in the Appendix). For instance, for the regression for 2020, relative risks for knowledge professionals being less likely to move to the Stockholm suburbs or to another metro area as opposed to staying in the Stockholm inner city became significant. In the case of arts and crafts occupations, the relative risk for moving to a medium-sized city, as opposed to staying in the inner city were no longer significantly different from 1. Similar differences can be observed for the 2015-2019 regression regarding place of birth, education and disposable income levels and self-employment. The only substantial change could be seen for the effect of having young children. For the pre-Covid period the relative risk for moving to the Stockholm suburbs as opposed to staying in the inner city were smaller than 1 for parents of young children, but after adding Solna and Sundbyberg, the relative risk indicated an increased probability of making such a move. Moreover, the re-definition of inner city Stockholm did not have an effect on the pattern that could be observed in Figure 5 showing the differences in the flows from the Stockholm inner city to the five different types of municipality of destination in terms of proportions (see Figure A1 in the Appendix).

Next, we classified occupations in quintiles by the reported ability to carry out work remotely. This data was published by Statistics Sweden (2021a) based on a survey of the amount of work done remotely by quarters in 2020 and 2021. Here, we focus on values for the fourth quarter of 2020, when remote work was at its peak. Table A4 in the Appendix shows that individuals with higher quintiles in remote work tend to have lower relative risk of moving to medium-sized city and small city and rural municipalities. This negative association became attenuated in 2020, when it often also became statistically insignificant. Those with higher quintiles of remote work tend to have a lower probability of moving to the Stockholm suburbs, relative to staying in the inner city and this relation did not change much between 2015-2019 and 2020. These results suggest that teleworking largely remains an urban phenomenon. They are also in line with our previous analyses where we did not find a positive association between knowledge sector work and counterurbanisation or suburbanisation moves.

## 6. Concluding discussion

Although much has been speculated about potential effects of the COVID-19 pandemic on patterns of residential mobility, and in particular about alleged urban exodus, our study is one of the first empirical examinations on this subject. We use high quality register data and can therefore study the determinants of out-migration from the Stockholm inner city.

Similar to other large cities across the world, individuals moved out of the Stockholm inner city to a higher extent in 2020 than during the five years preceding the COVID-19 pandemic. Although the Stockholm municipality had already been experiencing a net internal migration deficit since 2015, the negative trend was accentuated in 2020. The majority of movers relocated to the Stockholm suburbs, which experienced a substantial increase in the proportion of in-migration from the inner city. This suburbanisation trend was probably motivated by a desire for a larger dwelling in proximity to nature and the possibility of part-time teleworking after the pandemic. Although a growing suburbanisation seemed to be the dominant trend in 2020, small city and rural municipalities also experienced an increase in the proportion of inflows from individuals leaving Stockholm inner city. One can distinguish an increase in counter-urban migration during the first year of the pandemic. In particular, certain smaller municipalities received more in-movers from the Stockholm inner city in 2020, including tourist destinations such as the island of Gotland and the Åre ski resort. A similar trend was also observed in other countries such as the US (Kolko et al., 2021) and Japan (Fielding & Ishikawa, 2021).

Considering the determinants of counter-urban moves, our study showed that they were largely similar in 2020 and during the five years preceding the pandemic. Individuals moving from the Stockholm inner city to sparsely populated areas are predominantly Swedish-born and in their early adulthood. Self-employed individuals are overrepresented among counter-urban movers which can indicate that they have a greater freedom to work where they want. However, similar to Sandow and Lundholm (2020), we found that counter-urban movers are more likely to work within healthcare work and other public services (including education), which are occupations that are not typically performed remotely. Instead, it seems that counter-urban migration is facilitated when individuals have jobs that are in demand across the country. Therefore, the idea that remote work induces a counter-urban wave is not empirically confirmed in the case of Sweden.

It still remains to be seen whether the increase in out-migration from the Stockholm inner city observed in 2020 will be a temporary or a long-term trend. The newly released population data for 2021 show that the 2020 increase in net internal migration deficit for the Stockholm inner city was maintained and even accentuated in 2021. If the increase in out-migration from the Stockholm municipality that was observed during the first two years of the pandemic is sustained over time, it will have several policy implications. An important issue is the access to infrastructure and services in suburban municipalities and other municipalities that receive high inflows of individuals from the Stockholm inner city. Recipient municipalities may not only require a larger offer of medical services and schools, but even restaurants and places of recreation, in particular due to the rise of teleworking. The pandemic-related exodus from the Stockholm municipality also has implications for the future of the city-centre. Will the rise of remote work lead companies to vacate part of their offices? Will the housing prices in the inner city decrease if people continue to move away? What are the consequences for the restaurants and businesses which have office workers as an important part of their clientele? For more thorough discussions of the future of cities, see the book “Survival of the city” by Glaeser and Cutler (2021) and the article “Cities in a post-Covid world” by Florida et al. (2021).

In contrast to Stockholm, our analyses showed that Gothenburg and Malmö did not experience acceleration in out-migration from their inner city with the COVID-19 pandemic. Several reasons could explain this difference between the Swedish capital and the other two Swedish metropolitan cities. First, population density is significantly higher in the Stockholm municipality compared to Gothenburg and Malmö. In 2020, Stockholm hosted an average of 5211 people per square kilometre, while the corresponding figures for Gothenburg and Malmö were 2217 and 1302 (Statistics Sweden, 2022b). Stockholm’s dense environment implies fewer opportunities for social isolation, which can be an incentive to relocate. Second, Stockholm being an international capital with a strong service-based economy, it probably includes more jobs that can be performed remotely. A survey by Statistics Sweden (2021a) indeed shows that the proportion of individuals aged 15 to 74 who worked from home, at least on a part-time basis, during the last quarter of 2020 amounted to 58% in the municipality of Stockholm, 40% in Gothenburg and 44% in Malmö. Third, property prices, which were consistently high in Stockholm municipality during the recent years, have further increased with the pandemic. Owner-occupied apartments in Stockholm cost on average 99,000 Swedish crowns (SEK) per square metre in December 2020, while in Gothenburg they cost 63,800 SEK and in Malmö 35,800 SEK (Swedish Estate Agency Statistics, 2022).

Households in search of a larger dwelling and more comfortable conditions for teleworking may be forced to leave the Stockholm inner city for affordability reasons. In addition, Stockholm was hit hard early during the pandemic (SOU 2021:89), which could partly explain why out-migration from its inner city was more pronounced than in the other metropolitan municipalities. Finally, it is interesting to note that similar differences in Covid-related mobility patterns have been observed between cities in the US, where city-centre exodus took place in the largest metropolitan cities but not in smaller cities (The Economist, 2021, July).

Our study provided some useful insights about internal mobility trends in Sweden in times of pandemic. At the same time it is important to note that population registers only include recorded changes of address. This is potentially a substantial data limitation because we do not capture the individuals who moved to another residence, such as in second homes or with relatives, during the pandemic, but kept being registered in their primary residence. This implies that urban exodus is probably underestimated in our study as some people may have *de facto* left the city-centre without changing their official address.

Several aspects require further research. First, once newer data is available, it is important to analyse if the trends that appeared in 2020 were maintained in 2021. Second, research should focus on the changes in international migration flows to and from Sweden in relation to the pandemic, as well as their implications for the demographic profile of large Swedish cities and regions. Third, international comparisons of mobility dynamics in times of COVID-19 are of interest, especially as the strategies to tackle the pandemic have varied between countries. One reasonable assumption is that, given the relatively milder restrictions implemented in Sweden, the incentive to leave the inner city may have been less strong in Stockholm than in other cities where mandatory national or regional lockdowns were implemented. Finally, the expansion of multi-local lifestyles, where individuals divide their time between their main residence and their second home, is an issue that deserves more research and policy attention in the future.

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## Appendix

**Table A1.** Descriptive statistics for independent variables in sample for 2015-2020 by year.

| <b>Destination</b>   | <b>2014</b> | <b>2015</b> | <b>2016</b> | <b>2017</b> | <b>2018</b> | <b>2019</b> | <b>Total</b> |
|----------------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------|
| Stockholm inner city | 615 240     | 626 020     | 635 467     | 646 305     | 655 906     | 661 115     | 3 840 053    |
| Stockholm suburbs    | 22 203      | 21 803      | 22 629      | 23 068      | 23 453      | 26 416      | 139 572      |
| Other metro region   | 2085        | 2152        | 2210        | 2258        | 2250        | 2485        | 13 440       |
| Medium-sized city    | 2606        | 2575        | 2830        | 2906        | 2793        | 3135        | 16 845       |
| Small city/rural     | 2162        | 2272        | 2335        | 2372        | 2372        | 2819        | 14 332       |
| Total                | 644 296     | 654 822     | 665 471     | 676 909     | 686 774     | 6 95 970    | 4 024 242    |

**Table A2.** Descriptive statistics for independent variables in sample for 2015-2020 by destination.

|                                   |                         | Stay in<br>Stockholm<br>inner city | Stockholm<br>suburbs | Other<br>metro<br>region | Medium-<br>sized city | Small<br>city &<br>rural |
|-----------------------------------|-------------------------|------------------------------------|----------------------|--------------------------|-----------------------|--------------------------|
| <i>Sex</i>                        |                         |                                    |                      |                          |                       |                          |
|                                   | Male                    | 0.49                               | 0.53                 | 0.49                     | 0.52                  | 0.52                     |
|                                   | Female                  | 0.51                               | 0.47                 | 0.51                     | 0.48                  | 0.48                     |
| <i>Birthplace</i>                 |                         |                                    |                      |                          |                       |                          |
|                                   | Born in Stockholm       | 0.42                               | 0.35                 | 0.20                     | 0.21                  | 0.28                     |
|                                   | Born outside Stockholm  | 0.30                               | 0.24                 | 0.59                     | 0.54                  | 0.52                     |
|                                   | Foreign-born            | 0.28                               | 0.41                 | 0.21                     | 0.25                  | 0.20                     |
| <i>Age group</i>                  |                         |                                    |                      |                          |                       |                          |
|                                   | 25-39                   | 0.36                               | 0.68                 | 0.73                     | 0.69                  | 0.58                     |
|                                   | 40-54                   | 0.28                               | 0.20                 | 0.15                     | 0.17                  | 0.19                     |
|                                   | 55-64                   | 0.15                               | 0.07                 | 0.06                     | 0.08                  | 0.12                     |
|                                   | 65+                     | 0.20                               | 0.05                 | 0.06                     | 0.07                  | 0.12                     |
| <i>Education level</i>            |                         |                                    |                      |                          |                       |                          |
|                                   | Primary                 | 0.11                               | 0.09                 | 0.05                     | 0.09                  | 0.10                     |
|                                   | Secondary               | 0.38                               | 0.36                 | 0.30                     | 0.36                  | 0.41                     |
|                                   | Tertiary                | 0.48                               | 0.48                 | 0.63                     | 0.52                  | 0.47                     |
|                                   | Unknown                 | 0.03                               | 0.06                 | 0.02                     | 0.03                  | 0.02                     |
| <i>Disposable income</i>          |                         |                                    |                      |                          |                       |                          |
|                                   | 1st quartile (Low)      | 0.15                               | 0.19                 | 0.21                     | 0.23                  | 0.23                     |
|                                   | 2nd quartile            | 0.20                               | 0.18                 | 0.19                     | 0.20                  | 0.22                     |
|                                   | 3rd quartile            | 0.23                               | 0.27                 | 0.24                     | 0.26                  | 0.25                     |
|                                   | 4th quartile (High)     | 0.42                               | 0.36                 | 0.35                     | 0.30                  | 0.31                     |
| <i>Young children (aged 0-10)</i> |                         |                                    |                      |                          |                       |                          |
|                                   | No                      | 0.79                               | 0.72                 | 0.81                     | 0.77                  | 0.79                     |
|                                   | Yes                     | 0.21                               | 0.28                 | 0.19                     | 0.23                  | 0.21                     |
| <i>Civil status</i>               |                         |                                    |                      |                          |                       |                          |
|                                   | Single/divorced/widowed | 0.61                               | 0.65                 | 0.74                     | 0.71                  | 0.70                     |
|                                   | Married/partnered       | 0.39                               | 0.35                 | 0.26                     | 0.29                  | 0.30                     |

|                      |                                  |      |      |      |      |      |
|----------------------|----------------------------------|------|------|------|------|------|
| <i>Self-employed</i> |                                  |      |      |      |      |      |
|                      | No                               | 0.94 | 0.95 | 0.94 | 0.94 | 0.93 |
|                      | Yes                              | 0.06 | 0.05 | 0.06 | 0.06 | 0.07 |
| <i>Occupation</i>    |                                  |      |      |      |      |      |
|                      | Knowledge                        | 0.05 | 0.06 | 0.06 | 0.05 | 0.04 |
|                      | Healthcare                       | 0.02 | 0.02 | 0.03 | 0.03 | 0.03 |
|                      | Other public service             | 0.04 | 0.03 | 0.04 | 0.04 | 0.04 |
|                      | Arts & Crafts                    | 0.01 | 0.01 | 0.02 | 0.01 | 0.01 |
|                      | Hospitality                      | 0.01 | 0.02 | 0.02 | 0.02 | 0.02 |
|                      | Other                            | 0.47 | 0.53 | 0.50 | 0.48 | 0.46 |
|                      | No occupation/ not<br>registered | 0.40 | 0.32 | 0.34 | 0.36 | 0.39 |
| Total                |                                  | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**Table A3.** Determinants of out-migration from the Stockholm inner city for a subsample of movers from Stockholm inner city.

[illegible]

|  |                                  |                      |                      |                     |                     |                       |                      |                      |                      |
|--|----------------------------------|----------------------|----------------------|---------------------|---------------------|-----------------------|----------------------|----------------------|----------------------|
| <i>Civil status</i> (ref. Single/divorced/widowed) | Yes                              | 1.071***<br>(3.611)  | 0.784***<br>(-4.220) | 1.019<br>(0.379)    | 1.001<br>(0.009)    | 1.162***<br>(16.685)  | 0.765***<br>(-9.754) | 1.035<br>(1.468)     | 1.111***<br>(4.078)  |
|  | Married/<br>partnership          | 1.373***<br>(17.685) | 1.169***<br>(2.942)  | 1.248***<br>(4.841) | 1.300***<br>(5.631) | 1.300***<br>(30.951)  | 1.144***<br>(5.339)  | 1.180***<br>(7.552)  | 1.189***<br>(7.446)  |
| <i>Self-employed</i> (ref. No)                     | Yes                              | 1.072***<br>(2.697)  | 1.464***<br>(6.115)  | 1.439***<br>(6.618) | 1.568***<br>(8.115) | 1.008<br>(0.416)      | 1.196***<br>(3.682)  | 0.950<br>(-1.079)    | 1.223***<br>(4.487)  |
| <i>Occupation</i> (ref. Other)                     | Knowledge                        | 0.981<br>(-0.662)    | 0.904<br>(-1.213)    | 1.059<br>(0.755)    | 0.967<br>(-0.385)   | 0.967**<br>(-2.133)   | 0.995<br>(-0.107)    | 0.930*<br>(-1.719)   | 0.749***<br>(-5.429) |
|  | Healthcare                       | 0.977<br>(-0.442)    | 1.181<br>(1.307)     | 1.736***<br>(5.237) | 1.875***<br>(5.666) | 0.997<br>(-0.112)     | 1.295***<br>(4.123)  | 1.784***<br>(10.665) | 1.937***<br>(11.154) |
|  | Other public<br>service          | 1.125***<br>(2.849)  | 0.991<br>(-0.079)    | 1.224**<br>(2.091)  | 1.379***<br>(3.192) | 1.058***<br>(2.774)   | 1.001<br>(0.026)     | 1.362***<br>(6.662)  | 1.538***<br>(8.692)  |
|  | Arts & Crafts                    | 0.516***<br>(-9.078) | 0.993<br>(-0.051)    | 0.699**<br>(-2.309) | 0.914<br>(-0.594)   | 0.548***<br>(-16.953) | 0.934<br>(-0.900)    | 0.629***<br>(-5.447) | 0.622***<br>(-5.176) |
|  | Hospitality                      | 0.988<br>(-0.223)    | 1.182<br>(1.096)     | 0.977<br>(-0.169)   | 0.996<br>(-0.029)   | 0.944**<br>(-2.022)   | 1.179**<br>(2.055)   | 0.994<br>(-0.076)    | 1.081<br>(0.999)     |
|  | No occupation/ not<br>registered | 0.888***<br>(-5.722) | 1.018<br>(0.311)     | 0.896**<br>(-2.160) | 1.125**<br>(2.269)  | 0.904***<br>(-10.990) | 1.069***<br>(2.649)  | 1.076***<br>(3.255)  | 1.059**<br>(2.343)   |
| <i>Year</i>  | 2016                             |                      |                      |                     |                     | 1.109***<br>(9.148)   | 1.189***<br>(5.485)  | 1.143***<br>(4.673)  | 1.231***<br>(6.733)  |
|  | 2017                             |                      |                      |                     |                     | 1.140***<br>(11.559)  | 1.230***<br>(6.554)  | 1.273***<br>(8.548)  | 1.280***<br>(7.990)  |
|  | 2018                             |                      |                      |                     |                     | 1.143***<br>(11.825)  | 1.278***<br>(7.776)  | 1.321***<br>(9.903)  | 1.314***<br>(8.860)  |
|  | 2019                             |                      |                      |                     |                     | 1.090***<br>(7.631)   | 1.195***<br>(5.638)  | 1.196***<br>(6.292)  | 1.232***<br>(6.749)  |
| Pseudo R2  |                                  | 0.0314               |                      |                     |                     | 0.0284                |                      |                      |                      |
| N  |                                  | 93545                |                      |                     |                     | 425590                |                      |                      |                      |

z statistics in parentheses

\* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.010

**Table A4.** Determinants of out-migration from the Stockholm inner city for a sample with the municipalities of Solna and Sundbyberg classified as Stockholm inner-city.

|  |                | 2020                  |                       |                       |                       | 2015-2019              |                       |                       |                       |
|--|----------------|-----------------------|-----------------------|-----------------------|-----------------------|------------------------|-----------------------|-----------------------|-----------------------|
| Destination (ref. Stockholm inner city)      |                | Stockholm suburbs     | Other metro region    | Medium-sized city     | Small city & rural    | Stockholm suburbs      | Other metro region    | Medium-sized city     | Small city & rural    |
|  |                | <i>rrr</i>            | <i>rrr</i>            | <i>rrr</i>            | <i>rrr</i>            | <i>rrr</i>             | <i>rrr</i>            | <i>rrr</i>            | <i>rrr</i>            |
| <i>Sex</i> (ref. Male)                       |                |                       |                       |                       |                       |                        |                       |                       |                       |
|  | Female         | 0.854***<br>(-11.081) | 0.955<br>(-1.119)     | 0.830***<br>(-5.025)  | 0.893***<br>(-2.912)  | 0.853***<br>(-22.931)  | 0.955**<br>(-2.309)   | 0.838***<br>(-9.984)  | 0.814***<br>(-10.648) |
| <i>Birthplace</i> (ref. Stockholm region)    |                |                       |                       |                       |                       |                        |                       |                       |                       |
|  | Rest of Sweden | 0.964*<br>(-1.934)    | 4.432***<br>(28.305)  | 4.088***<br>(30.275)  | 2.661***<br>(22.052)  | 0.984*<br>(-1.776)     | 4.349***<br>(58.417)  | 4.112***<br>(63.346)  | 3.133***<br>(50.882)  |
|  | Outside Sweden | 1.433***<br>(21.343)  | 1.294***<br>(3.908)   | 1.404***<br>(6.144)   | 0.809***<br>(-3.688)  | 1.383***<br>(39.301)   | 1.295***<br>(8.219)   | 1.371***<br>(11.817)  | 0.876***<br>(-4.592)  |
| <i>Age group</i> (ref. 25-39)                |                |                       |                       |                       |                       |                        |                       |                       |                       |
|  | 40-54          | 0.431***<br>(-47.756) | 0.305***<br>(-20.015) | 0.357***<br>(-20.079) | 0.506***<br>(-13.144) | 0.419***<br>(-101.450) | 0.293***<br>(-43.190) | 0.345***<br>(-44.053) | 0.471***<br>(-29.592) |
|  | 55-64          | 0.262***<br>(-47.594) | 0.215***<br>(-17.835) | 0.356***<br>(-15.838) | 0.552***<br>(-9.499)  | 0.266***<br>(-96.497)  | 0.207***<br>(-37.819) | 0.259***<br>(-38.830) | 0.479***<br>(-22.926) |
|  | 65+            | 0.156***<br>(-55.986) | 0.149***<br>(-21.453) | 0.186***<br>(-22.082) | 0.333***<br>(-15.939) | 0.145***<br>(-116.889) | 0.110***<br>(-48.328) | 0.133***<br>(-52.478) | 0.258***<br>(-37.918) |
| <i>Education level</i> (ref. Primary)        |                |                       |                       |                       |                       |                        |                       |                       |                       |
|  | Secondary      | 0.966<br>(-1.331)     | 1.341***<br>(2.801)   | 0.838**<br>(-2.538)   | 0.994<br>(-0.091)     | 1.006<br>(0.533)       | 1.339***<br>(6.252)   | 0.927**<br>(-2.360)   | 0.999<br>(-0.044)     |
|  | Tertiary       | 0.821***<br>(-7.560)  | 1.803***<br>(5.699)   | 0.860**<br>(-2.156)   | 0.851**<br>(-2.202)   | 0.895***<br>(-9.036)   | 1.774***<br>(12.436)  | 0.837***<br>(-5.474)  | 0.773***<br>(-7.458)  |
|  | Unknown        | 1.252***<br>(6.125)   | 1.149<br>(0.837)      | 0.582***<br>(-4.003)  | 0.776*<br>(-1.759)    | 1.268***<br>(12.820)   | 1.262***<br>(3.068)   | 0.798***<br>(-3.832)  | 0.779***<br>(-3.576)  |
| <i>Disposable income</i> (ref. 1st quartile) |                |                       |                       |                       |                       |                        |                       |                       |                       |
|  | 2nd quartile   | 1.170***<br>(6.514)   | 0.823***<br>(-2.850)  | 0.861***<br>(-2.602)  | 0.835***<br>(-2.938)  | 1.042***<br>(3.571)    | 0.818***<br>(-6.323)  | 0.803***<br>(-7.967)  | 0.764***<br>(-9.138)  |
|  | 3rd quartile   | 1.116***<br>(4.622)   | 0.674***<br>(-5.837)  | 0.661***<br>(-7.092)  | 0.709***<br>(-5.522)  | 0.995<br>(-0.417)      | 0.594***<br>(-16.450) | 0.644***<br>(-15.974) | 0.588***<br>(-17.683) |
|  | 4th quartile   | 0.982<br>(-0.760)     | 0.567***<br>(-8.442)  | 0.424***<br>(-14.175) | 0.529***<br>(-10.081) | 0.896***<br>(-9.673)   | 0.495***<br>(-22.403) | 0.431***<br>(-29.588) | 0.399***<br>(-29.854) |
| <i>Young children</i> (ref. No)              |                |                       |                       |                       |                       |                        |                       |                       |                       |

|  |                                  |                      |                      |                     |                     |                       |                       |                      |                      |
|--|----------------------------------|----------------------|----------------------|---------------------|---------------------|-----------------------|-----------------------|----------------------|----------------------|
| <i>Civil status</i> (ref. Single/divorced/widowed) | Yes                              | 1.079***<br>(4.406)  | 0.694***<br>(-6.470) | 0.908**<br>(-1.991) | 0.922<br>(-1.548)   | 1.098***<br>(11.274)  | 0.630***<br>(-17.082) | 0.857***<br>(-6.740) | 0.948**<br>(-2.112)  |
|  | Married/<br>partnership          | 1.175***<br>(9.988)  | 0.939<br>(-1.217)    | 0.995<br>(-0.115)   | 1.012<br>(0.254)    | 1.125***<br>(15.077)  | 0.943**<br>(-2.378)   | 0.964*<br>(-1.721)   | 0.944**<br>(-2.554)  |
| <i>Self-employed</i> (ref. No)                     | Yes                              | 1.023<br>(0.991)     | 1.354***<br>(5.045)  | 1.323***<br>(5.310) | 1.460***<br>(7.134) | 0.947***<br>(-3.027)  | 1.068<br>(1.391)      | 0.838***<br>(-3.804) | 1.087*<br>(1.920)    |
| Occupation (ref. Other)                            | Knowledge                        | 0.852***<br>(-5.611) | 0.852**<br>(-1.965)  | 1.004<br>(0.048)    | 0.896<br>(-1.283)   | 0.842***<br>(-11.169) | 0.924*<br>(-1.871)    | 0.874***<br>(-3.249) | 0.694***<br>(-6.942) |
|  | Healthcare                       | 0.939<br>(-1.274)    | 1.131<br>(0.998)     | 1.679***<br>(5.131) | 1.838***<br>(5.698) | 0.915***<br>(-3.534)  | 1.208***<br>(3.096)   | 1.671***<br>(9.818)  | 1.830***<br>(10.516) |
|  | Other public<br>service          | 1.045<br>(1.157)     | 0.906<br>(-0.902)    | 1.132<br>(1.328)    | 1.278**<br>(2.517)  | 1.030<br>(1.547)      | 0.931<br>(-1.342)     | 1.273***<br>(5.373)  | 1.448***<br>(7.681)  |
|  | Arts & Crafts                    | 0.643***<br>(-6.134) | 1.150<br>(0.996)     | 0.817<br>(-1.342)   | 1.062<br>(0.411)    | 0.661***<br>(-11.657) | 1.067<br>(0.874)      | 0.725***<br>(-3.853) | 0.718***<br>(-3.689) |
|  | Hospitality                      | 1.027<br>(0.547)     | 1.252<br>(1.511)     | 1.023<br>(0.170)    | 1.045<br>(0.289)    | 1.017<br>(0.624)      | 1.224***<br>(2.583)   | 1.035<br>(0.491)     | 1.123<br>(1.532)     |
|  | No occupation/ not<br>registered | 0.926***<br>(-3.927) | 1.034<br>(0.596)     | 0.908*<br>(-1.939)  | 1.144***<br>(2.618) | 0.956***<br>(-5.202)  | 1.101***<br>(3.850)   | 1.112***<br>(4.754)  | 1.096***<br>(3.762)  |
| <i>Year</i> (ref. 2015)                            | 2016                             |                      |                      |                     |                     | 0.972***<br>(-2.637)  | 1.017<br>(0.537)      | 0.977<br>(-0.852)    | 1.040<br>(1.297)     |
|  | 2017                             |                      |                      |                     |                     | 0.995<br>(-0.502)     | 1.045<br>(1.427)      | 1.077***<br>(2.686)  | 1.071**<br>(2.268)   |
|  | 2018                             |                      |                      |                     |                     | 1.000<br>(0.015)      | 1.054*<br>(1.703)     | 1.093***<br>(3.262)  | 1.078**<br>(2.488)   |
|  | 2019                             |                      |                      |                     |                     | 0.983<br>(-1.607)     | 1.038<br>(1.193)      | 1.042<br>(1.473)     | 1.069**<br>(2.224)   |
| Pseudo R2  |                                  | 0.0533               |                      |                     |                     | 0.0550                |                       |                      |                      |
| N  |                                  | 794586               |                      |                     |                     | 3784871               |                       |                      |                      |

*z* statistics in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.010$

**Table A5.** Determinants of out-migration from the Stockholm inner city with quintiles in remote work.

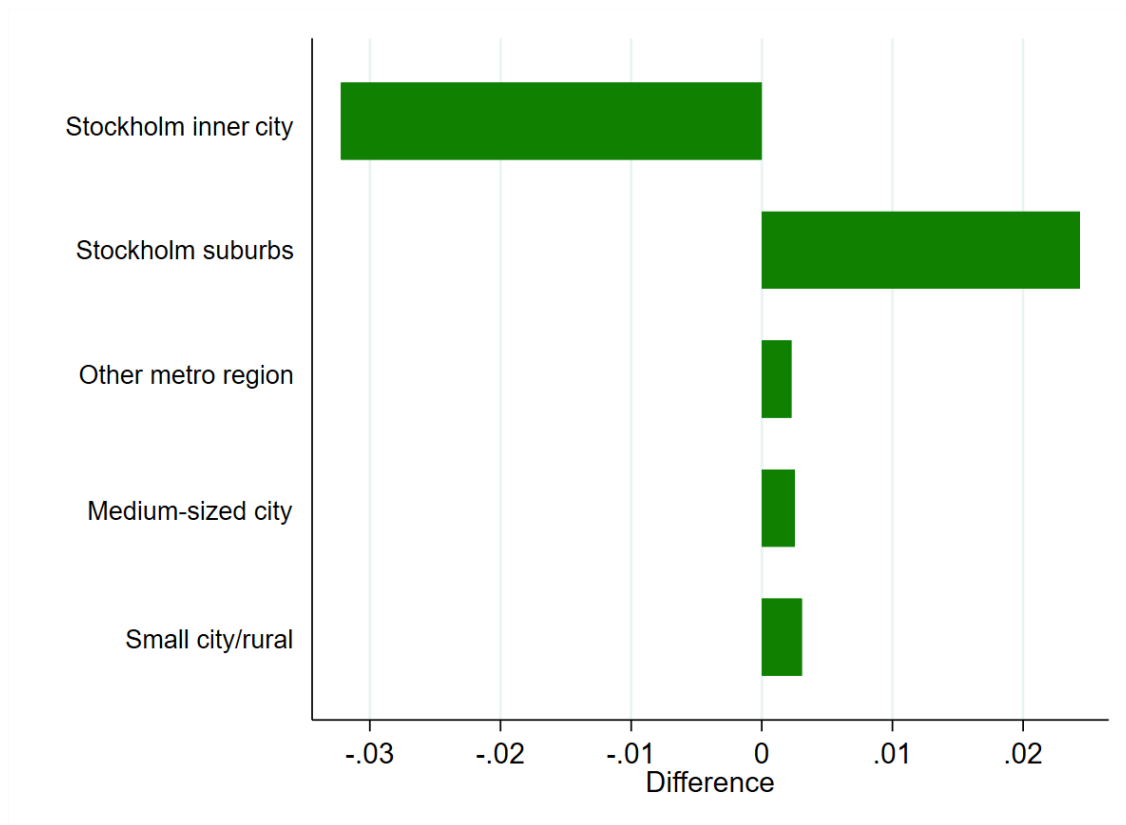
|  |                | 2020                  |                       |                       |                       | 2015-2019              |                       |                       |                       |
|--|----------------|-----------------------|-----------------------|-----------------------|-----------------------|------------------------|-----------------------|-----------------------|-----------------------|
| Destination (ref. staying in Stockholm inner city) |                | Stockholm suburbs     | Other metro region    | Medium-sized city     | Small city & rural    | Stockholm suburbs      | Other metro region    | Medium-sized city     | Small city & rural    |
|  |                | <i>rrr</i>            | <i>rrr</i>            | <i>rrr</i>            | <i>rrr</i>            | <i>rrr</i>             | <i>rrr</i>            | <i>rrr</i>            | <i>rrr</i>            |
| <i>Sex</i> (ref. Male)                             |                |                       |                       |                       |                       |                        |                       |                       |                       |
|  | Female         | 0.883***<br>(-7.730)  | 0.983<br>(-0.342)     | 0.875***<br>(-2.940)  | 0.987<br>(-0.261)     | 0.863***<br>(-17.749)  | 0.953*<br>(-1.884)    | 0.877***<br>(-5.573)  | 0.887***<br>(-4.535)  |
| <i>Birthplace</i> (ref. Stockholm region)          |                |                       |                       |                       |                       |                        |                       |                       |                       |
|  | Rest of Sweden | 1.007<br>(0.346)      | 4.866***<br>(24.877)  | 4.422***<br>(26.615)  | 2.900***<br>(19.269)  | 1.014<br>(1.393)       | 4.751***<br>(47.447)  | 4.270***<br>(50.152)  | 3.255***<br>(39.418)  |
|  | Outside Sweden | 1.499***<br>(20.749)  | 1.522***<br>(4.951)   | 1.381***<br>(4.358)   | 0.799***<br>(-2.734)  | 1.442***<br>(35.710)   | 1.676***<br>(11.831)  | 1.281***<br>(6.209)   | 0.803***<br>(-4.853)  |
| <i>Age group</i> (ref. 25-39)                      |                |                       |                       |                       |                       |                        |                       |                       |                       |
|  | 40-54          | 0.348***<br>(-51.516) | 0.284***<br>(-17.894) | 0.298***<br>(-18.915) | 0.458***<br>(-11.965) | 0.337***<br>(-103.400) | 0.272***<br>(-35.994) | 0.301***<br>(-36.949) | 0.472***<br>(-22.305) |
|  | 55-64          | 0.215***<br>(-46.523) | 0.220***<br>(-14.874) | 0.326***<br>(-13.829) | 0.592***<br>(-6.870)  | 0.220***<br>(-89.103)  | 0.202***<br>(-29.542) | 0.251***<br>(-29.388) | 0.526***<br>(-14.980) |
|  | 65+            | 0.150***<br>(-32.066) | 0.188***<br>(-10.799) | 0.264***<br>(-10.688) | 0.529***<br>(-5.837)  | 0.156***<br>(-49.861)  | 0.186***<br>(-17.013) | 0.269***<br>(-16.114) | 0.512***<br>(-9.088)  |
| <i>Education level</i> (ref. Primary)              |                |                       |                       |                       |                       |                        |                       |                       |                       |
|  | Secondary      | 0.950<br>(-1.379)     | 1.111<br>(0.651)      | 0.940<br>(-0.528)     | 1.203<br>(1.397)      | 0.996<br>(-0.233)      | 1.368***<br>(3.606)   | 1.083<br>(1.281)      | 0.982<br>(-0.295)     |
|  | Tertiary       | 0.863***<br>(-3.907)  | 1.467**<br>(2.400)    | 0.980<br>(-0.177)     | 1.149<br>(1.044)      | 0.936***<br>(-3.444)   | 1.817***<br>(6.939)   | 1.084<br>(1.295)      | 0.923<br>(-1.278)     |
|  | Unknown        | 1.387***<br>(5.897)   | 1.335<br>(1.120)      | 0.711<br>(-1.395)     | 1.272<br>(0.899)      | 1.527***<br>(14.133)   | 1.539***<br>(3.064)   | 1.360***<br>(2.654)   | 0.904<br>(-0.638)     |
| <i>Disposable income</i> (ref. 1st quartile)       |                |                       |                       |                       |                       |                        |                       |                       |                       |
|  | 2nd quartile   | 1.155***<br>(4.140)   | 0.912<br>(-0.933)     | 0.918<br>(-1.009)     | 0.960<br>(-0.416)     | 1.056***<br>(2.840)    | 0.905*<br>(-1.937)    | 0.849***<br>(-3.381)  | 0.815***<br>(-3.947)  |
|  | 3rd quartile   | 1.065*<br>(1.941)     | 0.705***<br>(-3.745)  | 0.698***<br>(-4.410)  | 0.776***<br>(-2.736)  | 0.982<br>(-1.050)      | 0.583***<br>(-11.098) | 0.685***<br>(-8.490)  | 0.586***<br>(-11.050) |
|  | 4th quartile   | 0.948<br>(-1.637)     | 0.551***<br>(-6.316)  | 0.469***<br>(-9.009)  | 0.566***<br>(-5.992)  | 0.885***<br>(-6.958)   | 0.462***<br>(-15.815) | 0.476***<br>(-16.221) | 0.403***<br>(-18.239) |
| <i>Young children</i> (ref. No)                    |                |                       |                       |                       |                       |                        |                       |                       |                       |
|  | Yes            | 0.972                 | 0.741***              | 0.906*                | 0.918                 | 0.980**                | 0.646***              | 0.874***              | 0.972                 |



|  |                         |                      |                     |                      |                      |                       |                     |                       |                       |
|--|-------------------------|----------------------|---------------------|----------------------|----------------------|-----------------------|---------------------|-----------------------|-----------------------|
| <i>Civil status</i> (ref. Single/divorced/widowed) |                         | (-1.476)             | (-4.701)            | (-1.739)             | (-1.351)             | (-2.051)              | (-13.168)           | (-4.616)              | (-0.877)              |
| <i>Self-employed</i> (ref. No)                     | Married/<br>partnership | 1.091***<br>(4.604)  | 0.924<br>(-1.257)   | 1.014<br>(0.253)     | 0.950<br>(-0.881)    | 1.042***<br>(4.207)   | 0.933**<br>(-2.143) | 0.936**<br>(-2.250)   | 0.907***<br>(-3.081)  |
|  | Yes                     | 0.941*<br>(-1.951)   | 1.368***<br>(3.834) | 1.241***<br>(2.952)  | 1.319***<br>(3.557)  | 0.872***<br>(-5.500)  | 1.060<br>(0.871)    | 0.739***<br>(-4.262)  | 0.879*<br>(-1.882)    |
| <i>Remote work</i> (ref. 1st quantile (Least))     |                         |                      |                     |                      |                      |                       |                     |                       |                       |
|  | 2nd quintile            | 0.977<br>(-0.644)    | 1.175<br>(1.466)    | 1.045<br>(0.473)     | 1.033<br>(0.324)     | 0.952***<br>(-2.581)  | 1.137**<br>(2.280)  | 0.882**<br>(-2.497)   | 0.840***<br>(-3.196)  |
|  | 3rd quintile            | 1.031<br>(1.407)     | 1.072<br>(0.981)    | 0.890*<br>(-1.881)   | 0.895*<br>(-1.696)   | 1.033***<br>(2.966)   | 1.129***<br>(3.425) | 0.827***<br>(-6.120)  | 0.750***<br>(-8.401)  |
|  | 4th quintile            | 0.826***<br>(-7.174) | 1.075<br>(0.915)    | 0.886*<br>(-1.730)   | 0.766***<br>(-3.410) | 0.842***<br>(-12.780) | 1.112***<br>(2.680) | 0.698***<br>(-9.656)  | 0.609***<br>(-11.759) |
|  | 5th quintile (Most)     | 0.953*<br>(-1.855)   | 1.100<br>(1.202)    | 0.779***<br>(-3.364) | 0.690***<br>(-4.497) | 0.891***<br>(-8.489)  | 0.957<br>(-1.027)   | 0.608***<br>(-12.398) | 0.532***<br>(-13.669) |
| <i>Year</i> (ref. 2015)                            |                         |                      |                     |                      |                      |                       |                     |                       |                       |
|  |                         |                      |                     |                      |                      | 0.951***<br>(-3.594)  | 1.022<br>(0.485)    | 0.990<br>(-0.231)     | 1.079*<br>(1.660)     |
|  |                         |                      |                     |                      |                      | 0.993<br>(-0.498)     | 1.102**<br>(2.350)  | 1.135***<br>(3.309)   | 1.152***<br>(3.273)   |
|  |                         |                      |                     |                      |                      | 0.976*<br>(-1.854)    | 1.106**<br>(2.459)  | 1.149***<br>(3.655)   | 1.098**<br>(2.160)    |
|  |                         |                      |                     |                      |                      | 0.973**<br>(-2.133)   | 1.061<br>(1.441)    | 1.081**<br>(2.050)    | 1.139***<br>(3.039)   |
| Pseudo R2  |                         | 0.0558               |                     |                      |                      | 0.0551                |                     |                       |                       |
| N  |                         | 429722               |                     |                      |                      | 1798948               |                     |                       |                       |

*z* statistics in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.010$



**Figure A1.** Differences in flows from the Stockholm inner city in terms of proportions between 2015-2019 and 2020 for a sample with Solna and Sundbyberg classified as Stockholm inner city.

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