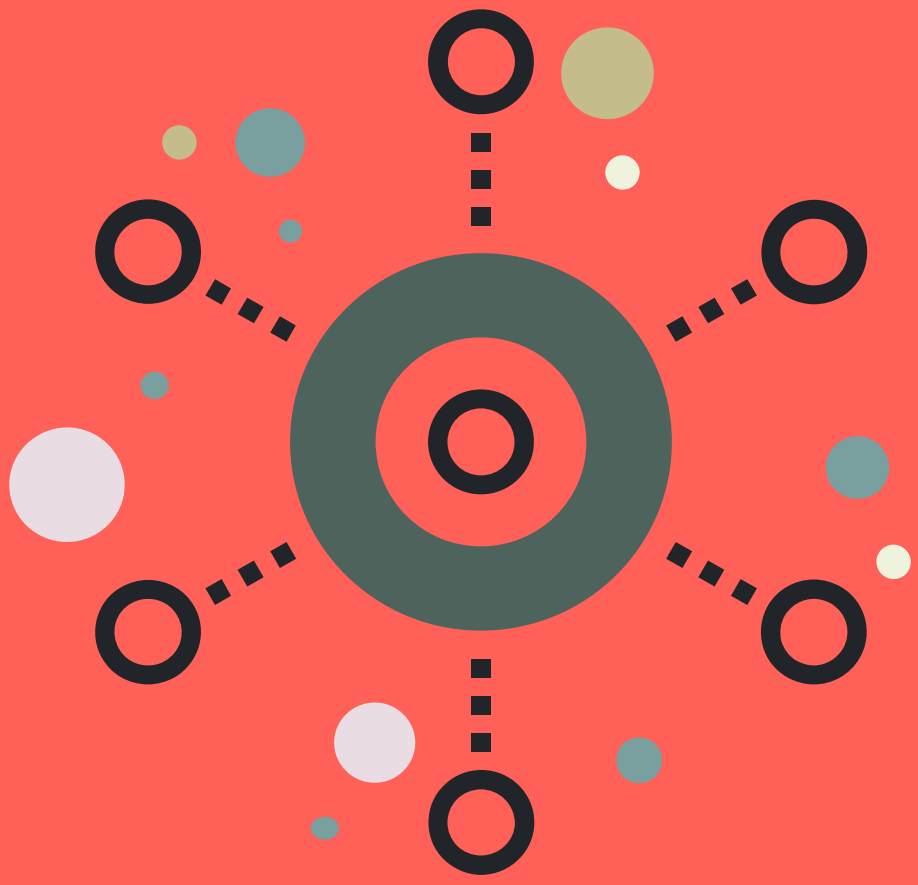

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Kent Eliasson | Olle Westerlund

Tillväxtanalys
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Dnr: 2019/162
Myndigheten för tillväxtpolitiska utvärderingar och analyser
Studentplan 3, 831 40 Östersund
Telefon: 010 447 44 00
E-post: info@tillvaxtanalys.se
www.tillvaxtanalys.se
För ytterligare information kontakta: Kent Eliasson
Telefon: 010- 447 44 32
E-post: kent.eliasson@tillvaxtanalys.se

Housing markets and geographical labour mobility to high productivity regions: the case of Stockholm*

Kent Eliasson[†‡] and Olle Westerlund[‡]

[†]The Swedish Agency for Growth Policy Analysis
[‡]Department of Economics, USBE, Umeå University

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Abstract

We analyse how conditions in the housing market affect labour mobility to the Stockholm region. The backdrop of the paper is emerging signs of declining migration to high productivity areas due to restrictions in the housing market and increasing regional differences in housing prices. Using detailed population-wide micro level data, the paper focuses on how regional variation in housing prices and homeownership influence the individual's decision whether to accept a job offer in the Stockholm region and the interrelated choice between migration and commuting as the mobility mode. The empirical results indicate that high relative housing prices in the Stockholm area reduce labour mobility to the region in general and labour mobility in terms of migration in particular. The estimates also show that homeowners are less likely to be mobile and to choose migration as mobility mode. Marginal effect analyses indicate that the negative influence on mobility of high relative housing prices and homeownership tend to be larger for young persons compared to older persons and for high skilled individuals compared to low skilled individuals.

Keywords: Housing markets, housing prices, homeownership, labour mobility, migration, commuting
JEL classification: J61, R23, R30, R31

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1. Introduction

The geographical mobility of labour is important for central macroeconomic issues such as unemployment and economic growth. Extensive international research shows that migration to larger and denser urban areas is associated with increased productivity and higher wages (e.g., Glaeser and Maré 2001, Combes et al. 2008, De la Roca and Puga 2017).[1] In order for labour to move to high productive regions, access to affordable housing is necessary. Without sufficient housing supply, high productivity cities will not grow through net migration of labour but become increasingly expensive places to live in. Research in the United States has shown that land use regulations and other barriers to construction have limited residential development and led to rising housing prices in a growing number of metropolitan areas (Glaeser et al. 2005 and 2006, Saks 2008). Ganong and Shoag (2017) and Austin et al. (2018) report that, since the 1990s, internal migration in the United States has declined considerably and become less directed towards high productivity places. The authors associate the slowdown in labour mobility in recent decades with increasing differences in real housing prices between low income and high income areas. Hsieh and Moretti (2019) show that land use restrictions have pushed up housing prices in the most productive cities in the United States and led to a spatial misallocation of labour that has substantially lowered GDP.

In a Swedish context, a discussion has emerged concerning restrictions on housing supply and soaring housing prices in the Stockholm region preventing labour from moving in, with negative economic consequences for the region and the country. But the scientific evidence supporting these claims is very limited. However, research based on Swedish data confirms that also in the case of Sweden, labour mobility to larger urban areas is associated with increased productivity and higher wages (Ahlin et al. 2014, Korpi and Clark 2019). This particularly pertains to migration to the Stockholm region (Eliasson and Westerlund 2019). Constraints in the housing market that reduce labour mobility to the Stockholm area may thus potentially negatively affect productivity and growth in the Swedish economy.

International research provides compelling evidence that housing prices affect residential mobility (e.g., Stein 1995, Genesove and Mayer 1997, Henley 1998, Chan 2001, Genesove and Mayer 2001, Engelhardt 2003, Ferreira et al. 2010, Ermisch and Washbrook 2012). Falling housing prices raise loan-to-value ratios for incumbent homeowners, and the remaining equity may be too low (or even negative) to meet down payment requirements to purchase a new home. In addition to equity constraints, homeowners tend to be unwilling to realise nominal losses (nominal loss aversion). Falling housing prices thus lead to lock-in effects and reduced mobility among existing homeowners. Transaction costs such as broker fees, stamp duties, mortgage fees, and taxes on capital gains have also been found to

[1] See Rosenthal and Strange (2004) and Puga (2010) for summaries of empirical results.

reduce residential mobility (e.g., Van Ommeren and Van Leuvensteijn 2005, Cunningham and Engelhardt 2008).

In an influential paper, Oswald (1996) argued that homeowners have constrained mobility due to transaction costs and that the increase in homeownership has contributed to higher and persistent unemployment in many countries. Oswald's hypothesis has inspired several papers that, based on micro-data, analyse the effect of homeownership on migration and outcomes such as unemployment and wages (e.g., Böheim and Taylor 2002, Helderman et al. 2004, Munch et al. 2006, Battu et al. 2008, Munch et al. 2008, Bloze and Skak 2016, Borg and Brandén 2018). Although the papers differ in their definitions of migration, data, and econometric techniques, they all find that homeowners are less geographically mobile than renters.[2] An exception is Jonsson (2012), who report results for Sweden indicating that homeowners are more likely to migrate to other regions in response to local labour market conditions.

There are also a few papers based on micro data that study how geographical differences in housing prices affect residential choice and long-distance commuting. If an individual in a low price area cannot accumulate enough equity to meet down payment requirements for a home in a high price area, the individual might have to forgo moving altogether or choose to commute to the new location. Both incumbent homeowners and new entrants into the housing market can face these types of spatial look-in effects. Öhman and Lindgren (2003) and Mitra and Saphores (2019) find that the probability of commuting long distance decreases with housing prices in the region of residence and increases with housing prices in the region of workplace. So et al. (2001) and Schéele and Andersson (2018) show that the likelihood of choosing to reside in an area decreases with its level of housing prices. Similar patterns can be observed in studies based on macro data. Cameron and Muellbauer (1998) concludes that high relative housing prices discourage net-migration to a region but encourage net-commuting. Cannari et al. (2000) find a negative effect of high relative housing prices on net-migration. Hämäläinen and Böckerman (2004) show that both increases in regional housing prices and a large share of homeownership discourages net-migration to a region by reducing in-migration. Another aspect studied based on macro data is how the stock of housing and new construction of housing influence migration. Karpestam (2018) finds that, while low levels of new construction generally tend to have a larger negative effect on intra-regional migration compared to inter-regional migration, the negative impact on net-migration to metropolitan regions can be substantial.

When analysing how conditions in the housing market can affect labour mobility to high productivity regions, it is important to consider both migration and commuting. The exiting literature suggests that

[2] However, the results concerning the effect on unemployment tend to contradict Oswald's hypothesis and show that homeowners generally have a lower probability of being unemployed.

homeownership and differences in regional housing prices tend to reduce migration and increase commuting. Negative effects of restrictions in the housing market on migration can therefore to some extent be mitigated by more commuting.

The primary contribution of this paper is that we simultaneously model how homeownership and spatial differences in housing prices affect the individual's decision whether to accept a job offer in a high productivity region (Stockholm) and the interrelated choice between migration and commuting as the mobility mode. The analysis is based on detailed population-wide micro level data that allows us to control for many other factors influencing the housing tenure and mobility decisions. We pay specific attention to how conditions in the housing market affect the mobility of young persons and highly educated individuals – two groups that have proven to be particularly mobile. To our knowledge, this is the first paper that, based on micro data, simultaneously model how conditions in the housing market affect the individual's geographical mobility in terms of migration and commuting.

The remainder of the paper is organised as follows. Section 2 provides some institutional background and descriptive statistics regarding the Swedish housing market and geographical mobility during recent decades. Section 3 presents the econometric model and the dataset. Section 4 reports the empirical results. Section 5 summarises the findings and offers some final remarks.

2. The Swedish housing market and geographical mobility

Before presenting descriptive statistics, we will briefly comment on a few aspects of the Swedish housing market. Homeownership is comparatively low in Sweden but has increased slightly during recent decades.[3] At present, about 62 percent of the housing stock consist of owner-occupied housing and 38 percent of rented housing.[4]

The Swedish market for rental housing is highly regulated compared to other countries.[5] The rental market consists of both public and private housing companies. A specific feature of the Swedish rental market is that both the private and public sector, to a large extent, operates under a centralised rent-setting system, where rents are negotiated between representatives of tenants and property owners. The rents are supposed to reflect the standard and location of a dwelling primarily. In this regulated market,

[3] Data from Eurostat show that the average homeownership rate in EU27 is 70 percent (refers to 2019).
[4] Owner-occupied housing consists of single-family homes and tenant-owned apartments in multi-dwelling buildings.
[5] According to a rental regulation index constructed by Weber and Lee (2020) for 18 developed countries, Sweden has among the top three most regulated rental markets.

two separate segments of rental housing have emerged in practice. A stock of newly produced dwellings with relatively high rents and a stock of older dwellings with lower rents. The latter is in principle only available via different queuing systems. Therefore, entrants in the rental market are primarily referred to newly produced dwellings with comparatively high rents (Bergendahl et al. 2015). The share of social housing in the rental sector is very limited. Instead, individuals in need of economic support can apply for housing allowance. This allowance is not tied to a specific home but instead follows the individual.

In terms of taxes and transaction costs, there are some elements that favour homeownership and potentially reduce mobility in the housing market. The former property tax (a typical *ad valorem* tax) was abolished in 2008 and was replaced by a highly regressive municipal property fee (with a low ceiling and that sharply declines in terms of share of the property value). Taxes on earnings can be reduced by up to 30 percent of the interest paid on mortgages. There is a 22 percent taxation on capital gains when selling a property (however, the tax can be postponed if a new home is bought). In addition, there are stamp duties (1.5 percent on the property value) and mortgage fees (2 percent of the mortgage). In this context, it is also worth mentioning that Finansinspektionen (FI, the Swedish Financial Supervisory Authority) recently has introduced new, stricter regulations on mortgages.[6]

Figure 1 presents the development of real housing prices and the share of rented dwellings for various regions over the last three decades. The regional classification consists of the three major metropolitan regions in Sweden and three size categories of municipalities located outside the metropolitan regions.

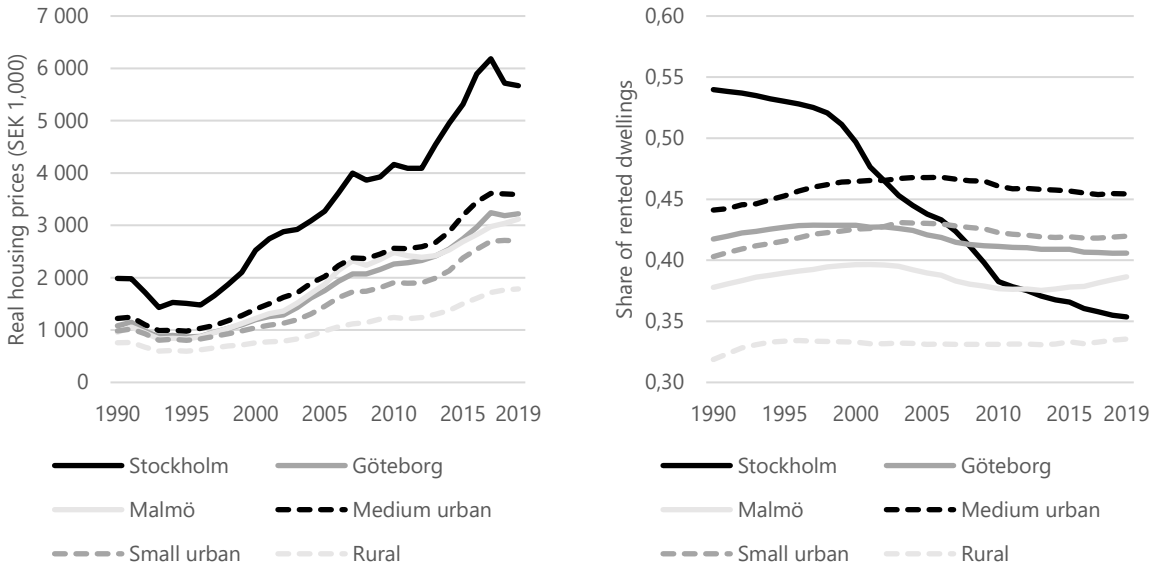
Housing prices fell in all regions during the deep economic recession in the early 1990s. The drop was most severe in the Stockholm region. It was not until the late 1990s that prices in the Stockholm area recovered to the pre-crisis level. After 2000, real housing prices grew steadily in all regions. What stands out in the figure is the significant increase in absolute price differences between the Stockholm region and other areas in Sweden.[7] By 2019, the difference between real housing prices in Stockholm and medium-sized municipalities located outside the metropolitan regions had increased to over 2 million

[6] The FI has issued a regulation of a maximum loan-to-value (LTV) ratio of 85 percent of the property value for new mortgages (applies from October 2010). In 2016, the FI introduced a first mandatory amortization requirement on new mortgages (applies from June 2016). According to this, mortgages with an LTV ratio between 50 and 70 percent should be amortised with at least 1 percent per year, and mortgages with an LTV ratio above 70 percent should be amortised with at least 2 percent per year. In 2018, the FI introduced a second mandatory amortisation requirement on new mortgages (applies from March 2018). According to this, mortgages above 4.5 times the borrower's annual income before tax should be amortised with at least an additional 1 percent per year.

[7] However, it is only the small urban municipalities and the rural municipalities that have experienced an increase in the relative price difference vis-à-vis Stockholm. Housing prices have increased more than income over time and therefore increased the debt-to-income ratio for new entrants into the housing market. The regional dispersion of incomes is considerably lower than the regional dispersion of housing prices. All else equal, regional differences in housing prices in absolute terms increases the debt-to-income ratio for the average income earner if moving to regions with higher housing prices.

SEK (from an initial 766 thousand SEK).[8] The corresponding difference concerning rural municipalities has grown to 3.9 million SEK (from an initial 1.2 million SEK). Because of considerably declining nominal interest rates during the period, growing regional differences in housing prices have not automatically translated into corresponding regional differences in housing costs. Nevertheless, due to regulations such as down payment requirements and mandatory amortisation of mortgages, housing prices can still be a binding restriction for an individual trying to buy a new home, even though the individual could afford to pay the interest on a mortgage.[9]

Figure 1 Real housing prices and share of rented dwellings by region (1990–2019)



Notes: Housing prices refer to single-family homes and are weighted with regard to the number of purchases and the average purchase price in the municipalities included in each region type. Housing prices are expressed in SEK 1,000 and 2019 real prices using the national CPI. Share of rented dwellings is calculated as rented dwellings in relation to the sum of rented and owner-occupied housing. The regional classification consists of the three largest counties, and the remaining municipalities grouped into three categories depending on their size in terms of employment (medium-sized urban ≥ 60,000, small urban ≥ 30,000, rural < 30,000).

Figure 1 also displays a dramatic decline in the share of rented dwellings in the Stockholm region. Since 1990, the share has dropped from 54 to 35 percent. The fall was particularly large during the first decade of the 2000s. Both a low share of rented dwellings in newly constructed buildings and many tenure conversions from rented dwellings to tenant-owned apartments contributed to the decline in the share of rented dwellings in Stockholm since 2000.[10] As a result of this development, the supply of rental housing has not only dropped in relative terms. Since 1990, the total number of rented dwellings has decreased by around 50,000, corresponding to 11 percent of the initial stock. In the same period, the population in the Stockholm region has increased by 45 percent. New entrants on the housing market in the Stockholm area thus compete for a much smaller supply of rental housing than previously.

[8] In 2019, 1,000 SEK was equivalent to about 94 Euros or 106 USD.
[9] See footnote 6 for current regulations on mortgages in Sweden.
[10] The number of tenure conversions since 2000 (in total about 130,000) correspond to a third of the stock of rented dwellings in 2000. Author's calculations based on data from Statistics Sweden.

Turning to the development of geographical mobility, there is no similar trend of decreasing inter-regional migration in Sweden as reported by Ganong and Shoag (2017) and Austin et al. (2018) for the United States. Since the early 1980s, the inter-county migration rate in Sweden has hovered around 2 percent, with a slightly increasing trend over time. During the same period, commuting between Swedish municipalities has increased dramatically (Tillväxtanalys 2020). Between 1980 and 2019, the share of employed individuals who commute to work outside their municipality of residence has increased from 20 percent to 34 percent.

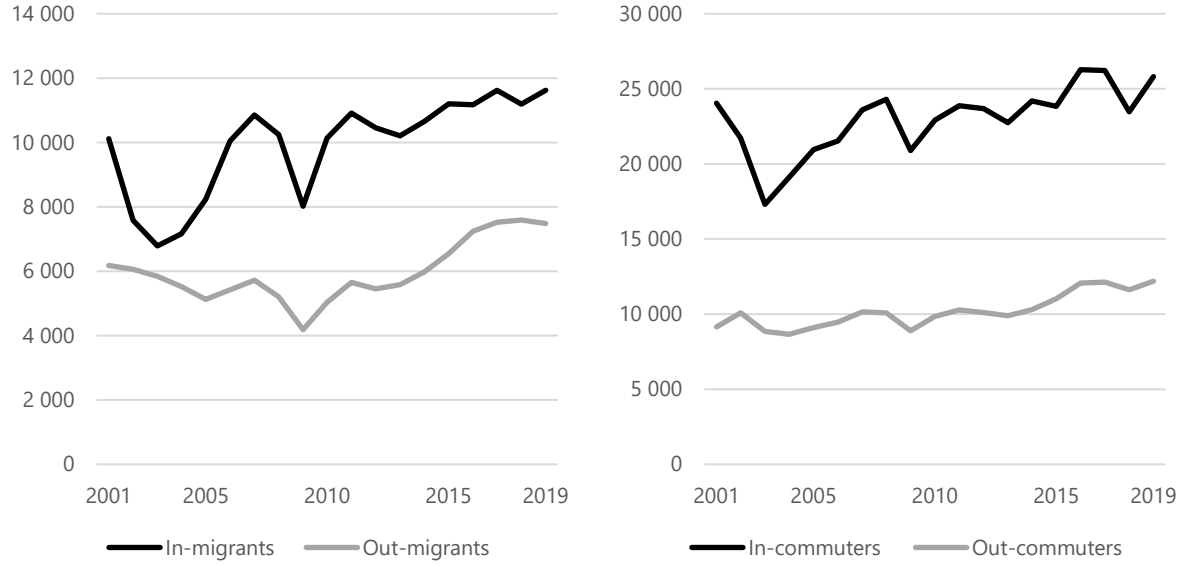
Figure 2 presents data on labour mobility in terms of migration and commuting to and from the Stockholm region since 2000. The focus is on labour market related mobility. In-migrants refers to individuals moving into the Stockholm region for work, and out-migrants refers to individuals moving out from the Stockholm region for work in other parts of the country. In-commuters refers to individuals residing outside the Stockholm region who start to commute to work in the region, and out-commuters refers to individuals residing in the Stockholm region who start to commute to work in other parts of the country. Thus, the applied definitions of labour mobility capture gross flows of increasing/decreasing labour supply in the Stockholm region.[11]

In-migration to the Stockholm region displays a clear cyclical pattern, with considerable downturns in the early 2000s and in connection with the global financial crisis in 2008–2009. After the financial crisis, there is a slight positive trend in in-migration. Out-migration from Stockholm show a similar development, although the cyclical pattern is less pronounced. Throughout the period, the Stockholm area has experienced positive net-migration. Since 2006, net-migration has been hovering around 5,000 individuals annually. Figure 4 in the Appendix reports data on total migration to and from the Stockholm region (i.e., not only labour market related migration). The pattern is qualitatively similar, with positive net-migration since 2005, albeit with a decreasing trend after 2012.

Figure 2 also presents the development of commuting to and from the Stockholm region. The scale of the figure reveals that the number of individuals starting to commute is much higher than the number of migrants. Again, we find cyclical variations (particularly for in-commuting) and positive trends after the financial crisis. Throughout the period, the Stockholm area has received substantial net gains of people beginning to commute, with an average of around 13,000 individuals annually. We stress that the reported numbers do not refer to the stock of existing commuters each year but rather the flow of individuals who start to commute to and from the Stockholm region each year.

[11] See section 3 for more detailed definitions of labour mobility.

Figure 2 Labour mobility to and from the Stockholm region (2001–2019)



Notes: Refers to domestic mobility and individuals aged between 20 and 69. The number of commuters refers to individuals that start to commute each year (not the stock of existing commuters). See the text for additional definitions of mobility.

The descriptive statistics on geographical labour mobility indicate that the Stockholm region has continued to experience net gains in labour supply over the last two decades. Based on these data, it is difficult to determine what role the housing market has played in terms of mobility. One could argue that increasing absolute differences in real housing prices vis-à-vis other regions in Sweden and a decreasing share of rented dwellings in the Stockholm area have at least not resulted in a negative trend in labour market related net-migration. The growing in-commuting to the Stockholm region could, on the other hand, be interpreted as an indication that people searching for jobs in the Stockholm area finds it increasingly difficult to find affordable housing in the region.

Looking at the age distribution of labour mobility to and from the Stockholm region (Figure 5 in the Appendix), the data reveal significant net gains in labour market related migration among individuals 20 to 30 years of age. In the age group 30 to 45 years, when family formation typically occurs, the Stockholm area experience net out-migration. This might reflect families searching for larger homes experiencing difficulties finding affordable housing in the Stockholm region. But there might be many other causes in play behind the net out-migration from Stockholm in the family formation age groups.

3. Data and empirical model

To investigate how homeownership and spatial differences in housing prices affects labour mobility to the Stockholm region, we use detailed population-wide micro level data based on registers administered

by Statistics Sweden. This dataset includes information on housing prices, house tenure, location of residence and workplace, and a wide range of demographic and socio-economic variables that characterise individuals.

Our geographical definition of the Stockholm region includes all municipalities in Stockholm County (26 in total). In terms of employment, the region is heavily dominated by Stockholm City and the most closely adjacent municipalities. The total number of jobs in the region is about 1.3 million, of which around 72 percent are in these core municipalities. Previous research show that the functional integration of a region depends on labour commuting. The tendency to commute as a function of travel time distance generally follows a non-linear pattern, with high commuting rates at short distances and low rates above approximately 45 minutes (Johansson et al. 2002 and 2003, Tillväxtanalys 2020). All but one of the 26 municipalities in the region are within 40 minutes travel time distance from Stockholm City. The region is highly integrated internally in terms of commuting and commuting flows out of the region are very limited.[12]

In our definition of labour mobility to the Stockholm region, we simplify the regional system to a set of two regions: all municipalities located outside the Stockholm region and the Stockholm region. We focus on potential geographical mobility between year $t-1$ and year t, and given that we are interested in labour related mobility, all individuals are required to be employed in year t. We define in-migrants to the Stockholm region as individuals who neither reside nor work in the Stockholm region in year $t-1$, but who move and start to work in the region in year t. In-commuters are defined as individuals who neither reside nor work in the Stockholm region in year $t-1$, but who start to commute to work in the region in year t (and continue to reside outside the region in year t). Our definition of labour mobility thus captures gross flows of migrants and commuters that increase the labour supply in the Stockholm region. Note that although all municipalities located outside the Stockholm region is treated as an aggregated unit in these definitions, spatial variations in relevant variables across all municipalities located outside the Stockholm area will be considered in the estimations.

The empirical analysis focus on labour mobility to the Stockholm region between 2017 $(t-1)$ and 2018 (t). The applied dataset includes about 1 million individuals aged between 20 and 60, who neither reside nor work in the Stockholm region in year $t-1$. Their original municipalities of residence $(t-1)$ are located within a maximum of 240 minutes travel time distance from Stockholm City.

[12] In 2018, 97 percent of the employed residents were employed at workplaces located in the region and the average commuting rate into Stockholm City for those residing in one of the other 25 municipalities in the region was 38 percent.

We do not derive a formal theoretical model; however, the applied empirical model involves arguments from a classical Alonso (1964) type of model in combination with job search. All individuals are regarded as potential job searchers, and the individual's decision of where to work and where to live involves a trade-off between commuting and housing costs. The individual is assumed to jointly select a workplace and residential location that maximizes utility. We do not observe the underlying search process and utilities, but the observed choice of workplace and residential location reveals which combination provides the highest utility.

Given our simplified regional structure, we observe the outcome of two simultaneous decisions: the individual's decision whether to search for and accept a job requiring mobility to the Stockholm region and the interrelated choice between migration and commuting as mobility mode. In the specification of the econometric model, it is important to note that the choice of mobility mode can only be observed for those individuals who start to work in the Stockholm region. However, the sample of geographically mobile workers is not necessarily a random sample of the underlying population of job searchers. Potential problems with sample selection bias are handled in the econometric specification by employing an extension of the standard Heckman (1979) procedure in a bivariate probit setting. The bivariate probit model with sample selection was introduced by Van de Ven and Van Praag (1981).

Let Y_{1i} denote empirical observations of the individual's decision whether to search for and accept a job in the Stockholm region, where $Y_{1i} = 1$ if mobility is observed (i.e., the individual accepts a job offer in Stockholm) and $Y_{1i} = 0$ otherwise. Similarly, let Y_{2i} indicate empirical observations of the individual's choice between migration and commuting, where $Y_{2i} = 1$ if migration is observed and $Y_{2i} = 0$ otherwise. Clearly, Y_{2i} is observed only if $Y_{1i} = 1$. The latent variables Y_{1i}^* and Y_{2i}^* are determined by a set of independent variables (discussed below), represented by the vectors X_{1i} and X_{2i}. This gives the following general specification of the econometric model:

$$
\begin{aligned}
&Y_{1i}^* = X_{1i}\beta_1 + \varepsilon_{1i} \\
&Y_{1i} = 1 \text{ if } Y_{1i}^* > 0,\ Y_{1i} = 0 \text{ otherwise} \\
&\\
&Y_{2i}^* = X_{2i}\beta_2 + \varepsilon_{2i} \\
&Y_{2i} = 1 \text{ if } Y_{2i}^* > 0,\ Y_{2i} = 0 \text{ otherwise}
\end{aligned}
\qquad (1)
$$

where β_1 and β_2 are vectors of unknown parameters to be estimated, and the disturbances ε_{1i}, ε_{2i} are assumed to be bivariate standard normally distributed, with correlation coefficient ρ. Three outcomes are possible: (i) individual *i* search for and accepts a job in the Stockholm region and chooses to migrate so that $Y_{1i} = 1$ and $Y_{2i} = 1$; (ii) individual *i* search for and accepts a job in the Stockholm region and

chooses to commute so that $Y_{1i} = 1$ and $Y_{2i} = 0$; and (iii) individual *i* does not search for or does not accept a job in the Stockholm region so that $Y_{1i} = 0$. This produces the following unconditional probabilities for the three outcomes:

$$\begin{aligned} &\Pr(Y_{1i} = 1, Y_{2i} = 1) = \Phi_2(X_{1i}\beta_1, X_{2i}\beta_2, \rho) \\ &\Pr(Y_{1i} = 1, Y_{2i} = 0) = \Phi_2(X_{1i}\beta_1, -X_{2i}\beta_2, -\rho) \\ &\Pr(Y_{1i} = 0) = \Phi(-X_{1i}\beta_1) \end{aligned} \quad (2)$$

where Φ_2 and Φ denote the bivariate standard normal cdf and the univarite standard normal cdf, respectively. Recognising that Y_{2i} is observed only if $Y_{1i} = 1$, the log-likelihood function for this model can be written as:

$$\ln L = \sum_{Y_{1i}=1, Y_{2i}=1} \ln\Phi_2(X_{1i}\beta_1, X_{2i}\beta_2, \rho) + \sum_{Y_{1i}=1, Y_{2i}=0} \ln\Phi_2(X_{1i}\beta_1, -X_{2i}\beta_2, -\rho) + \sum_{Y_{1i}=0} \ln \Phi(-X_{1i}\beta_1) \quad (3)$$

The parameters β_1 and β_2 along with the correlation coefficient ρ are estimated by maximising $\ln L$. The joint estimation procedure has two major advantages. First, even though the first probit equation in (1) can be estimated separately, as it is completely observed, the joint estimation will be more efficient if $\rho \neq 0$. Second, in the case $\rho \neq 0$, the joint estimation corrects for potential sample selection bias in the second probit equation in (1), and thereby provides consistent estimates of the underlying population parameters (i.e., parameters that are valid for all potential job searchers in our sample, not only those who start to work in the Stockholm region).

Since we focus on potential geographical mobility between December 31 in year $t-1$ and December 31 in year t, all our independent variables are measured either during or at the end of year $t-1$ (if not otherwise indicated). Definitions of independent variables and sample means are presented in Table 1.

We focus particularly on regional differences in housing prices[13] and homeownership as determinants of the individual's mobility decision. The variable measuring regional differences in housing prices is defined as the weighted average housing price in the Stockholm region in relation to the average housing price in the individual's original municipality of residence.[14] The weighted average housing price for Stockholm is calculated with respect to the number of purchases and the average purchase price in each

[13] One might also consider prices on tenant-owned apartments, but these are not available at the municipality level. Given that the correlation between the two at county level is very high (0.95), spatial differences in housing prices is probably a good indicator of the overall difference between locations in prices for owned housing.

[14] As a robustness check, we will also report results using the difference between the weighted average housing price in the Stockholm region and the average housing price in the individual's municipality of residence.

of the 26 municipalities in the region. Therefore, although we treat the housing market in the Stockholm area as one market (which makes sense from a labour supply perspective given that the region is highly integrated in terms of commuting), the weighted average housing price takes revealed preferences for housing in different locations in the region into account. We focus on differences in housing prices instead of differences in housing costs. Apart from the practical matter that housing costs are not available in our dataset, housing prices are relevant for the mobility decision in that the individual must satisfy down payment and amortisation requirements to buy a house in a new location.[15] The model includes two dummy variables for homeownership. One for single-family homes and one for tenant-owned apartments (renters are hence the reference category).

To obtain credible estimates of the effect of housing prices and homeownership on geographical labour mobility, it is important to account for other attributes influencing the individual's mobility decision and choice of housing tenure. To that end, we add the following independent variables to the model, all of which are theoretically and/or empirically relevant according to previous research.[16]

It is well known that distance is a deterrent for both migration and commuting. We therefore include a variable measuring the road travel time distance between the individual's original municipality of residence and Stockholm City. Previous research has shown that people prefer to reside in large cities/regions, especially for dual income families. We therefore add a variable measuring the size of the individual's original municipality of residence (in terms of employment).

The literature on migration and commuting have identified numerous demographic, family-related, and socio-economic variables affecting mobility. We include variables measuring gender, age, country of birth (three categories), level of education (six categories), and family status (being married or having children in the household).

Another important determinant of mobility is the individual's labour market status. We add variables indicating whether the individual is employed, unemployed, enrolled in education, or outside the labour force (for other reasons than education).

Several studies report considerable differences in mobility behaviour depending on previous experience of mobility. We add variables indicating experience of migration or commuting during years $t-5$ to $t-2$.

[15] See footnote 6 for current regulations on mortgages in Sweden.
[16] See e.g., Costa and Kahn (2000), Van Ommeren (2000), Rouwendal and Meijer (2001), Compton and Pollak (2007), Andrews et al. (2011), Greenwood (2021). On Swedish data, see e.g., Eliasson et al. (2003), Öhman and Lindgren (2003), Andersson et al. (2018), Tano et al. (2018), Tillväxtanalys (2020).

Table 1 Definitions and sample means

Variable	Definition	Whole sample	Mobility observed	Migration observed
Relative housing price (j/i)	The weighted average housing price in the Stockholm region (j) in relation to the average housing price in the original municipality of residence (i)	2.68	2.13	2.19
House owner	Dummy variable = 1 if residence is single-family home	0.47	0.27	0.08
Apartment owner	Dummy variable = 1 if residence is tenant-owned apartment	0.17	0.21	0.21
Log distance (ij)	Log of road travel time distance (in seconds)[a] between the original municipality of residence (i) and Stockholm City (j)	8.76	8.52	8.68
Log size (i)	Log of number of employees in the original municipality of residence (i)	10.25	10.53	10.67
Female	Dummy variable = 1 female	0.50	0.44	0.50
Age	Age in years	40.05	33.56	28.82
Sweden	Dummy variable =1 if born in Sweden	0.83	0.76	0.73
Nordic	Dummy variable =1 if born in another Nordic country	0.017	0.016	0.011
Upper secondary	Dummy variable = 1 if highest level of education is upper secondary education	0.50	0.37	0.27
Post-secondary 2 years	Dummy variable = 1 if highest level of education is post-secondary education, 2 years or shorter	0.14	0.20	0.23
Post-secondary 3 years	Dummy variable = 1 if highest level of education is post-secondary education, 3 years	0.15	0.21	0.30
Post-secondary 4+ years	Dummy variable = 1 if highest level of education is post-secondary education, 4 years or longer	0.10	0.10	0.11
Doctoral	Dummy variable = 1 if highest level of education is doctoral or equivalent programme	0.014	0.020	0.010
Married	Dummy variable = 1 if married or cohabitee	0.52	0.31	0.11
Children	Dummy variable = 1 if children present in the household	0.41	0.27	0.10
Unemployed	Dummy variable = 1 if not employed and unemployment benefits is the main income	0.006	0.016	0.008
Student	Dummy variable = 1 if not employed and income from studying (grants and loans) is the main income	0.024	0.131	0.233
Out of labour force	Dummy variable = 1 if not employed and no unemployment benefits or income from studying	0.033	0.104	0.120
Migration experience	Dummy variable = 1 if migrated across municipality border at least once during years t-5 to t-2	0.11	0.26	0.38
Commuting experience	Dummy variable = 1 if commuted across municipality border during at least one of the years t-5 to t-2	0.36	0.54	0.55
Job vacancy ratio (i)	Number of job vacancies[b] in relation to total employment in the original municipality of residence (i)	0.020	0.019	0.021
Number of observations		669,801	13,217	3,335

Note: Sample means refer to individual's whose original municipality of residence is located within 180 minutes travel time distance from Stockholm City. If not otherwise indicated, all variables are measured either during or at the end of year t-1. All data are administered by Statistics Sweden except a) the National Road Database, administered by the Swedish Road Administration, and b) job vacancies, administered by the Swedish Public Employment Service.

Finally, we include a measure of labour demand in the individual's original municipality of residence, defined as the number of job vacancies in relation to total employment. All independent variables, except the last, are included in both vectors X_{1i} and X_{2i} above. To avoid identification of the model based solely on distributional assumptions, the variable measuring local labour demand is excluded from the migration equation. Our argument is that the job vacancy ratio in the original municipality of residence most likely will affect whether the individual decides to search for a job in the Stockholm region but is less likely to influence the choice between migration and commuting given that a job in Stockholm is

accepted. A well-known problem is that, without additional strong assumptions, the validity of the exclusion restriction is untestable.[17] As a complement, we will also present results where we treat the mobility equation and the migration equation in (1) as independent probit equations, which in effect implies that we assume that $\rho = 0$.

4. Empirical results

4.1. Estimated parameters

The model is estimated for individual's whose original municipality of residence is located within three different radiuses from Stockholm City. Our base line estimates include all individuals residing within 180 minutes travel time distance from Stockholm. As a robustness check, we also estimate the model for individuals living within 240 or 120 minutes from Stockholm.

Table 2 presents the maximum likelihood estimates of the base line model. Beginning with the housing market related variables, we find that the relative housing price in the Stockholm region decreases the probability of starting to work in Stockholm and decreases the likelihood of choosing migration as mobility mode.[18] In other words, the higher the housing price is in the Stockholm area in relation to the housing price in the original municipality of residence, the less likely is the individual to begin to work in Stockholm and to choose migration as mobility mode. The finding that high relative housing prices tend to discourage migration and encourage commuting is in line with previous research (see Section 1). However, our results also show that if we consider geographical labour mobility both in terms of migration and commuting, high relative housing prices have an overall negative effect on labour mobility to the Stockholm region.

Continuing with the variables indicating homeownership, the estimates show that both house owners and apartment owners are less likely to begin working in the Stockholm region and to choose migration as mobility mode than renters (the reference category). This finding does not only confirm results from previous research indicating that homeowners are less likely to migrate but shows that homeowners are more geographically constrained in general (i.e., when both migration and commuting are considered).

[17] For transparency, it is worth noting that the vacancy ratio is clearly statistically significant in the probit mobility equation (p-value<.01) but statistically insignificant if included in the probit migration equation (p-value>0.10). Obviously, this is not a formal test of validity and should hence be interpreted cautiously.
[18] The results are qualitatively similar if we define the housing price variable as a difference instead of a ratio. Using the log of the difference between the weighted average housing price in the Stockholm region and the average housing price in the individual's original municipality of residence gives the following estimated parameters (z-values) in the mobility and migration equation: -0.5224 (-19.01) and -0.5161 (-9.25).

Table 2 Estimates of the bivariate probit model with sample selection

	(1) Mobility observed ($Y_1 = 1$)		(2) Migration observed ($Y_1 = 1, Y_2 = 1$)	
	Coefficient	z-statistic	Coefficient	z-statistic
Relative housing price (j/i)	-0.0981	-12.81	-0.0880	-6.61
House owner	-0.0683	-6.34	-0.3091	-8.45
Apartment owner	-0.0513	-4.77	-0.0711	-3.39
Log distance (ij)	-0.5042	-37.91	0.0276	0.33
Log size (i)	-0.0329	-5.01	-0.0571	-4.05
Female	-0.1249	-15.47	0.0055	0.21
Age	-0.0153	-5.04	-0.0111	-1.62
Age square	0.0000	1.03	-0.0001	-1.16
Sweden	-0.1023	-9.81	-0.2254	-8.59
Nordic	0.0115	0.37	-0.1098	-1.53
Upper secondary	-0.0279	-1.94	-0.0107	-0.35
Post-secondary 2 years	0.1549	9.64	0.2515	7.49
Post-secondary 3 years	0.2257	13.85	0.4408	11.58
Post-secondary 4+ years	0.1589	8.69	0.3923	9.57
Doctoral	0.2800	8.93	0.3472	4.69
Married	-0.0926	-7.87	-0.2332	-6.83
Children	-0.1119	-9.05	-0.2741	-7.32
Unemployed	0.5312	15.69	0.2348	2.65
Student	0.5920	38.24	0.5729	21.18
Out of labour force	0.5534	35.63	0.4927	16.06
Migration experience	0.1164	10.86	0.2714	9.46
Commuting experience	0.2618	29.60	0.1510	6.05
Job vacancy ratio (i)	-0.0112	-12.10		
Constant	3.5944	27.84	-1.4010	-2.22
ρ			0.9093	
Wald test of independent eq. ($\rho = 0$)			26.09	p>chi2=0.00
Log L	-62,823.3			
Number of observations	669,801			
Selected	13,217			
Nonselected	656,584			

Note: Refers to individual's whose original municipality of residence is located within 180 minutes travel time distance from Stockholm City. z-statistics based on robust standard errors.

The estimated effects of relative housing prices and homeownership on geographical labour mobility are qualitatively similar when we re-estimate the model for individuals residing within 240 or 120 minutes distance from Stockholm (see Table 5 in the Appendix).

An alternative to using the bivariate probit model with sample selection is to treat the mobility equation and the migration equation in (1) as independent probit equations, which implies that we assume that $\rho = 0$. The estimated effects on geographical mobility of relative housing prices and homeownership turns out to be qualitatively similar when using this restricted model (see Table 6 in the Appendix).

Turning to the other variables in the model, the estimates in Table 2 show that the probability of taking a job in the Stockholm region as expected decreases with distance to Stockholm and with the size of the individual's original municipality of residence. The latter also has a negative effect on the likelihood of choosing migration as mobility mode. This result confirms findings in previous research showing that people tend to prefer to live in larger cities.

The estimates further show that the likelihood of geographical mobility decreases with age and that females and native Swedes have a lower probability of starting to work in the Stockholm region. Our results also indicate that people with a post-secondary level of education or higher are more likely to take a job in the Stockholm area and to choose migration as mobility mode than individuals with only primary or lower secondary education (the reference category). Family ties appears to have a negative effect on geographical mobility. Being married or having children in the household reduces the probability of starting to work in the Stockholm region and to choose migration as mobility mode. The individual's attachment to the labour market also influences geographical mobility. The estimates reveal that unemployed individuals and persons enrolled in education or outside the labour force for other reasons are more likely to begin working in the Stockholm area and choose migration than employed individuals (the reference category). The findings also show that individuals with previous experience of geographical mobility are more inclined to take a job in the Stockholm region and to choose migration as mobility mode. Turning to the variable measuring local labour demand, we find that the probability of starting to work in the Stockholm area decreases with the job vacancy ratio in the individual's original municipality of residence. The effect of the different demographic and socio-economic/economic attributes listed above generally confirm results found in previous literature on migration and commuting.[19]

Finally, the estimate of ρ is positive and statistically significant, indicating that unobserved heterogeneity increasing the probability of taking a job in the Stockholm region is associated with a higher probability of migration (lower probability of commuting).

[19] See footnote 16 for previous research in the field.

4.2 Estimated marginal effects

Table 3 reports estimated average marginal effects of relative housing prices and homeownership in the bivariate probit model. The two tenure types, single-family homes and tenant-owned apartments are combined into one category, labelled homeowner, to simplify the interpretations. In all cases, the marginal effects are negative and statistically significant. An increase in the relative housing prices reduces the probability of mobility by about 0.4 percentage points, and being a homeowner reduces the probability of slightly below 0.3 percentage points. Given that the underlying average mobility is 1.97 percent, the marginal effects are quite substantial.[20]

Table 3 Estimated average marginal effects of relative housing price and homeownership in the bivariate probit model

	(1) Mobility observed $(Y_1 = 1)$		(2) Migration observed $(Y_1 = 1, Y_2 = 1)$	
	Marginal effect	z-statistic	Marginal effect	z-statistic
Relative housing price (j/i)	-0.0042	-13.01	-0.0014	-3.05
Homeowner	-0.0026	-6.62	-0.0024	-2.51

Note: Refers to individual's whose original municipality of residence is located within 180 minutes travel time distance from Stockholm City. z-statistics based on robust standard errors.

Two groups that are particularly interesting in the context of geographical mobility are young people and highly educated individuals. The literature on geographical mobility consistently shows that young individuals around 20 to 30 years of age are the most mobile, particularly in terms of migration (see also Figure 4 in the Appendix). Another recurring finding in the literature is that geographical mobility tends to increase with the individual's level of education (which is also confirmed by the estimations above). The latter result is interesting given that empirical research on agglomeration economics indicates that the positive effect on labour productivity of working in large cities/regions is particularly high for individuals with high levels of education or high levels of cognitive skills (Wheeler 2001, Rosenthal and Strange 2008, Bacolod et al. 2009, Carlsen et al. 2016, Korpi and Clark 2019, Tillväxtanalys 2020). This finding implies that spatial misallocation of highly educated individuals due to constraints in the housing market can be particularly damaging for productivity and economic growth.

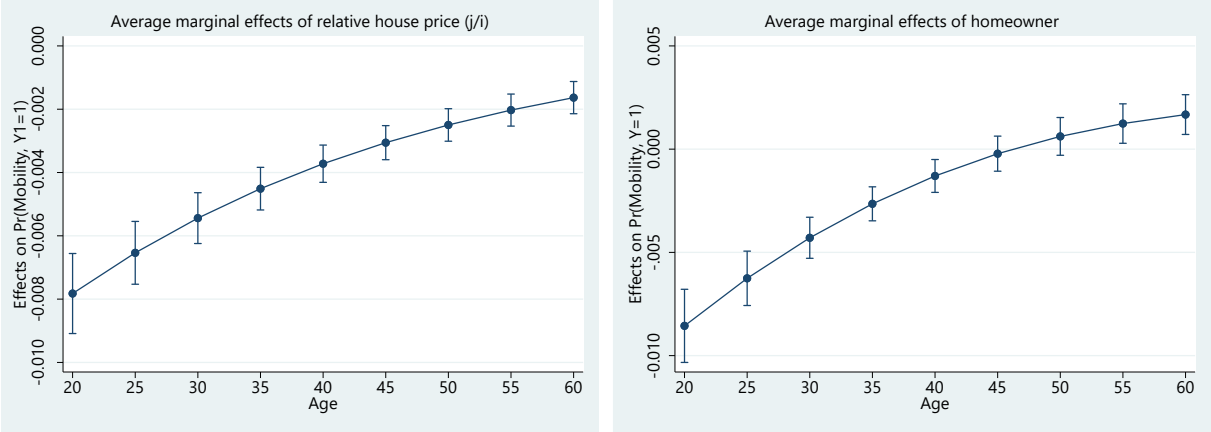
Figure 3 report estimated marginal effects of relative housing prices and homeownership in the probit model for mobility across different age groups (i.e., the probability of starting to work in the Stockholm region). We see that the negative effect on mobility of high relative housing prices in the Stockholm area tends to decline with increasing age (i.e., the negative effect is higher for young individuals than older persons). The negative effect is about 0.8 percentage points for 20-year-olds, compared to around 0.2 percentage points for 60-year-olds (we saw earlier that the average marginal effect was -0.4

[20] Of the 669,801 individuals residing within 180 minutes from Stockholm, 13,217 started to work in the Stockholm region (see Table 2).

percentage points). One possible explanation for this result is that for young people with limited accumulated financial wealth, down payment requirements might be a binding constraint for entering the market for owned housing.[21] If young individuals receive a job offer requiring mobility, they are thus to a larger extent referred to the rental market (which we know from Figure 1 have declined considerably in the Stockholm region), to commuting as mobility mode, or to forgo the job offer altogether.

Figure 3 also reveals that the negative effect on mobility of homeownership tends to decline with increasing age. For 20-year-olds, the effect is around -0.9 percentage points, compared to a positive effect of about +0.2 percentage points for 60-year-olds (we saw earlier that the average marginal effect was slightly below -0.3 percentage points). This result could reflect differences in loan-to-value (LTV) ratios between younger and older homeowners. The higher the LTV, the less equity is left after a sale to purchase a new home. This can be a binding constraint when entering a high-priced housing market like the Stockholm region. Data from the Swedish Financial Supervisory Authority show that the LTV ratio decreases significantly with age (Finansinspektionen 2019). For individuals under 30 years of age, the average LTV is close to 80 percent. For people between 50 and 60 years of age, the average LTV is well below 60 percent.

Figure 3 Estimated average marginal effects of relative housing price and homeownership in the probit model for mobility across age



Note: Refers to individual's whose original municipality of residence is located within 180 minutes travel time distance from Stockholm City. The figure also includes 95 % confidence intervals based on robust standard errors.

Table 4 present estimated marginal effects of relative housing prices and homeownership in the probit model for mobility for low skilled and high skilled people. High skilled refers to individuals having at least three years of post-secondary education, and low skilled refers to individuals with less education. The results indicate a slightly larger negative effect of relative housing prices for high skilled individuals. The negative effect is about 0.6 percentage points, compared to around 0.4 percentage points for low skilled individuals. One would perhaps expect the opposite, given that high skilled individuals

[21] See footnote 6 for current regulations on mortgages imposed by the Swedish Financial Supervisory Authority.

presumably have more financial resources available for buying a home in the Stockholm area. One possible explanation for this somewhat surprising result is that the two groups are focused on different subsets of the Stockholm housing market when deciding whether to start working in the region. High skilled individuals might primarily consider owned housing in locations with high commuting accessibility to Stockholm City (and thus relatively high prices), whereas the residential choice set for low skilled individuals also might include owned housing in less expensive areas as well as homes in the rental market.

Furthermore, the estimates in Table 4 reveal that homeownership only seem to constrain the mobility of high skilled individuals. This finding is also somewhat unexpected. Again, it might reflect that the residential choice set differs between the two groups. If high skilled individuals primarily aim for more attractive locations in the Stockholm region, the equity left after a sale might be insufficient to purchase a new home in a high-price area in Stockholm.

Table 4 Estimated average marginal effects of relative housing price and homeownership in the probit model for mobility across skill level

	Relative housing price (j/i)				Homeowner			
	Marginal effect	z-statistic	95%	CI	Marginal effect	z-statistic	95%	CI
Low skilled	-0.0039	-12.65	-0.0045	-0.0033	-0.0001	-0.22	-0.0009	0.0007
High skilled	-0.0057	-9.62	-0.0069	-0.0046	-0.0099	-11.58	-0.0115	-0.0082

Note: Refers to individual's whose original municipality of residence is located within 180 minutes travel time distance from Stockholm City. z-statistics and confidence intervals are based on robust standard errors.

5. Summary and discussion

The paper analyses how conditions in the housing market influence the individual's decision whether to accept a job offer in the Stockholm region and the interrelated choice between migration and commuting as the mobility mode. We specifically focus on the role of regional variation in housing prices and homeownership and use detailed population-wide micro level data that allow us to control for many other factors influencing the housing tenure and mobility decisions.

We find that high relative housing prices in the Stockholm area reduces labour mobility to the region, particularly labour mobility in terms of migration. Our results also show that homeowners are less likely to be mobile and to choose migration as mobility mode. Marginal effect analyses across age and level of education indicate that the negative impact on mobility of high relative housing prices and homeownership tend to be larger for young persons and high skilled individuals.

In the paper, we underline the importance of considering both migration and commuting when analysing how conditions in the housing market affect labour mobility to high productivity regions. The finding

that high relative housing prices and homeownership tend to discourage migration and encourage commuting suggests that negative effects of restrictions in the housing market on migration to some extent might be mitigated by increased commuting. However, our results show that, even if this is the case, high relative housing prices and homeownership have an overall negative effect on labour mobility to the Stockholm region.

Without efficient housing markets, high productivity regions will not grow through net mobility of labour. Instead, they will become increasingly more expensive places to live in. The literature on agglomeration economics consistently show that labour productivity is higher in larger and denser areas. This finding holds especially for highly educated workers. Spatial misallocation of labour due to housing market restrictions can thus be costly in terms of productivity and economic growth. Particularly worrying in this context is the finding that high relative housing prices and homeownership tend to be a larger obstacle for geographical mobility to the Stockholm region among high skilled individuals.

The housing market in the Stockholm region is currently characterised by high relative housing prices vis-à-vis other parts of Sweden and by a small and declining market for rented dwellings. One important ingredient for continued growth in the region is increased supply of housing that meets different needs and tastes. However, policies to increase geographical mobility and reduce spatial misallocation of labour are not confined to measures directed at the housing market. Other fields of policy are also important. Investments in transportation and other communication infrastructure that facilitate inter-regional and intra-regional mobility are one example.

In the paper, we have indicated that conditions related to the mortgage market, such as down payment and amortisation requirements, could be one of several possible explanations for various groups different mobility behaviour. One area for future research would be to more explicitly analyse how the recently imposed stricter regulations on mortgages in Sweden have affected different groups' residential and geographical mobility. Another topic would be to apply a more detailed classification of residential choice sets and study how conditions in these specific housing markets influence various groups geographical mobility.

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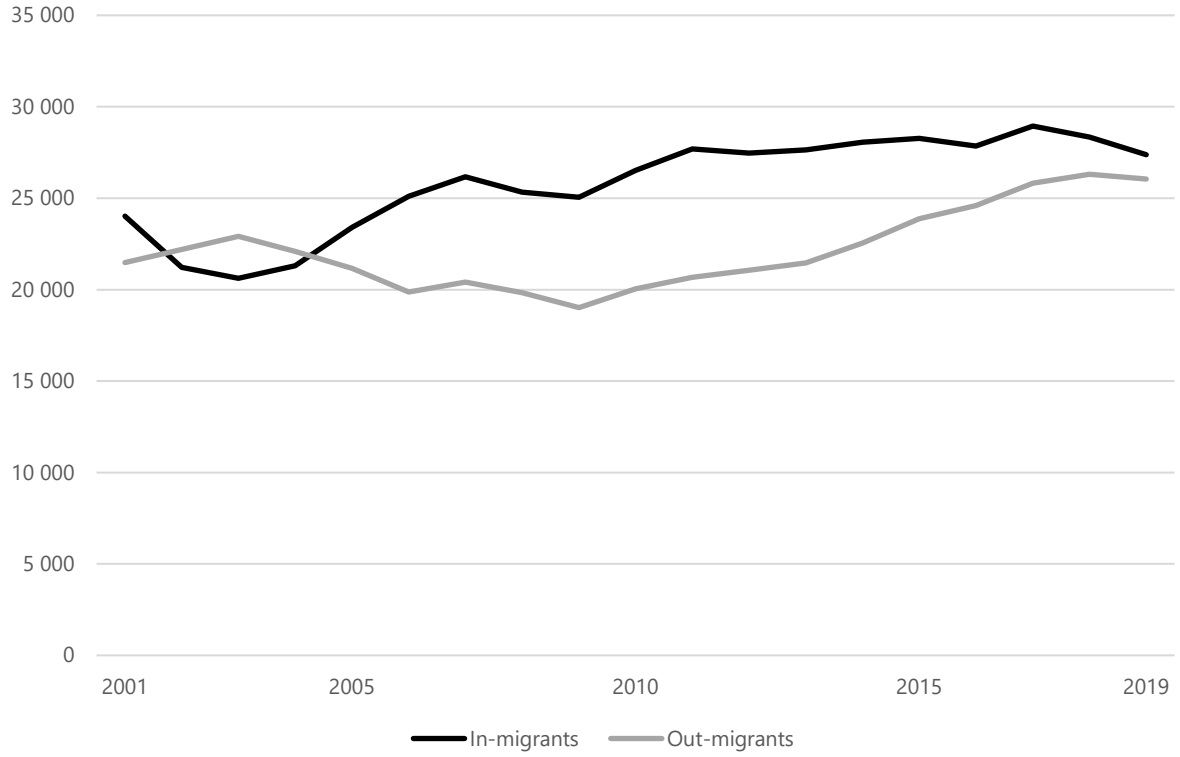
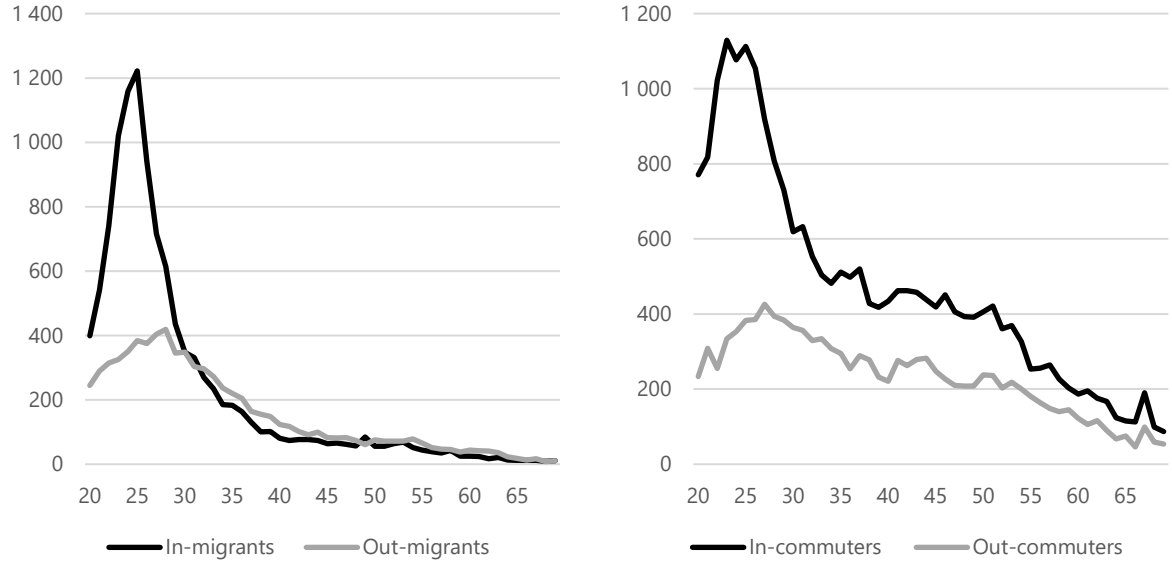
Appendix

Figure 4 Migration to and from the Stockholm region (2001–2019)



Notes: Refers to domestic migration and individuals aged between 20 and 69.

Figure 5 Labour mobility to and from the Stockholm region by age (2018)



Notes: Refers to domestic mobility and individuals aged between 20 and 69. See Section 2 for definitions of mobility.

Table 5 Estimates of the bivariate probit model with sample selection (alternative travel time radius)

	120 minutes travel time radius				240 minutes travel time radius			
	(1) Mobility observed $(Y_1 = 1)$		(2) Migration observed $(Y_1 = 1, Y_2 = 1)$		(1) Mobility observed $(Y_1 = 1)$		(2) Migration observed $(Y_1 = 1, Y_2 = 1)$	
	Coefficient	z-stat	Coefficient	z-stat	Coefficient	z-stat	Coefficient	z-stat
Rel. housing price (j/i)	-0.2044	-11.01	-0.0525	-1.03	-0.0634	-11.76	-0.0682	-6.28
House owner	-0.0581	-4.17	-0.2937	-6.33	-0.0811	-8.59	-0.3754	-5.37
Apartment owner	-0.0541	-4.05	-0.0983	-3.13	-0.0639	-6.58	-0.0816	-3.51
Log distance (ij)	-0.5410	-12.78	-0.2275	-1.81	-0.4758	-51.60	0.1659	0.76
Log size (i)	-0.0827	-9.79	-0.0620	-2.81	-0.0124	-2.14	-0.0412	-2.90
Female	-0.1312	-12.70	0.0762	2.15	-0.1141	-15.97	0.0559	0.99
Age	-0.0114	-2.90	0.0088	0.79	-0.0160	-5.99	-0.0105	-1.29
Age square	0.0000	-0.17	-0.0004	-2.39	0.0001	1.58	-0.0001	-1.10
Sweden	-0.0903	-6.85	-0.2256	-6.60	-0.0937	-9.97	-0.2579	-6.19
Nordic	0.0319	0.87	-0.1013	-1.06	0.0254	0.89	-0.1303	-1.50
Upper secondary	-0.0304	-1.67	-0.0378	-0.80	-0.0166	-1.31	-0.0106	-0.31
Post-secondary 2 y	0.1486	7.25	0.1880	3.69	0.1555	10.92	0.2522	6.74
Post-secondary 3y	0.1961	9.41	0.3341	6.48	0.2101	14.40	0.4717	8.43
Post-secondary 4+ y	0.1234	5.35	0.2385	4.04	0.1621	9.86	0.4610	6.90
Doctoral	0.2084	5.58	0.2743	2.64	0.3017	10.30	0.3750	4.55
Married	-0.0778	-5.13	-0.2668	-5.34	-0.1009	-9.66	-0.3009	-5.84
Children	-0.1111	-7.03	-0.3182	-6.06	-0.1154	-10.53	-0.3105	-5.82
Unemployed	0.6213	14.29	-0.1421	-0.82	0.5104	17.05	0.0885	0.53
Student	0.6006	28.60	0.5008	10.65	0.5834	42.55	0.5249	7.47
Out of labour force	0.6032	30.56	0.5033	10.24	0.5412	39.38	0.4215	5.39
Migration exp	0.1061	7.54	0.3210	9.18	0.1315	14.10	0.3345	7.32
Commuting exp	0.2909	25.64	0.1174	3.21	0.2462	31.38	0.0642	0.95
Job vacancy ratio (i)	-0.0166	-14.23			-0.0076	-10.70		
Constant	4.6315	15.35	0.5176	0.53	3.0056	26.90	-2.5288	-1.66
ρ			0.7755				0.7476	
Wald test ($\rho = 0$)			22.38	pr=0.00			4.29	pr=0.04
Log L	-38,936.3				-79,061.3			
Number of obs.	296,480				1,021,851			
Selected	8,893				15,945			
Nonselected	287,587				1,005,906			

Note: z-statistics based on robust standard errors.

Table 6 Separate probit estimates of the mobility and migration equation

	(1) Mobility observed $(Y_1 = 1)$		(2) Migration observed $(Y_2 = 1 \mid Y_1 = 1)$	
	Coefficient	z-statistic	Coefficient	z-statistic
Relative housing price (j/i)	-0.0994	-13.05	-0.0509	-2.37
House owner	-0.0694	-6.45	-0.4483	-9.69
Apartment owner	-0.0512	-4.75	-0.0634	-1.90
Log distance (ij)	-0.4972	-38.17	0.8496	23.10
Log size (i)	-0.0313	-4.80	-0.0481	-2.23
Female	-0.1254	-15.54	0.1856	6.90
Age	-0.0155	-5.10	0.0034	0.30
Age square	0.0000	1.09	-0.0003	-1.80
Sweden	-0.1025	-9.82	-0.2668	-7.79
Nordic	0.0117	0.37	-0.2303	-2.08
Upper secondary	-0.0271	-1.89	0.0163	0.32
Post-secondary 2 years	0.1559	9.70	0.2250	4.09
Post-secondary 3 years	0.2268	13.91	0.4641	8.39
Post-secondary 4+ years	0.1607	8.78	0.4608	7.38
Doctoral	0.2795	8.91	0.2306	1.92
Married	-0.0923	-7.85	-0.2895	-5.62
Children	-0.1114	-9.01	-0.3383	-6.37
Unemployed	0.5348	15.77	-0.3140	-2.66
Student	0.5928	38.24	0.2138	5.61
Out of labour force	0.5521	35.57	0.1389	3.08
Migration experience	0.1159	10.83	0.3348	11.04
Commuting experience	0.2613	29.50	-0.0902	-3.19
Job vacancy ratio (i)	-0.0122	-14.30		
Constant	3.5427	27.78	-7.0748	-17.39
Log L	-56,761.0		-6,067.3	
Number of observations	669,801		13,217	

Note: Refers to individual's whose original municipality of residence is located within 180 minutes travel time distance from Stockholm City. z-statistics based on robust standard errors.

Tillväxtanalys har regeringens uppdrag att analysera och utvärdera statens insatser för att stärka Sveriges tillväxt och näringslivsutveckling. Genom vår kunskap bidrar vi till att effektivisera, ompröva och utveckla politiken

I vårt arbete fokuserar vi på avgörande frågor för tillväxten i en öppen och kunskapsbaserad ekonomi som Sverige. Våra analyser och utvärderingar baserar sig på vetenskap och beprövad erfarenhet.

Sakkunniga medarbetare, unika databaser och utvecklade samarbeten på nationell och internationell nivå är viktiga tillgångar i vårt arbete. För att göra våra kunskapsunderlag relevanta och använda för vi en kontinuerlig dialog med dem som berörs.

Tillväxtanalys finns i Östersund (huvudkontor) och Stockholm.

Den kunskap vi tar fram tillgängliggör vi på www.tillvaxtanalys.se. Anmäl dig gärna till vårt nyhetsbrev för att hålla dig uppdaterad om våra pågående och planerade analys- och utvärderingsprojekt. Du kan även följa oss på LinkedIn.

Tillväxtanalys
Myndigheten för tillväxtpolitiska utvärderingar och analyser

Tillväxtanalys
Studentplan 3, 831 40 Östersund
Telefon: 010-447 44 00
E-post: info@tillvaxtanalys.se
Webb: www.tillvaxtanalys.se